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Light, Air, and Space Within the "Urban Poche" : Investigations on Housing for Western Cities of Today's Society

Werner Hofmann

Light, Air, and Space within the "Urban Poché"

Investigations on Housing for Western Cities of Today's Society

by
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Dipl. Arch. ETHZ

Master's Thesis

Submitted to the School of Architecture
in partial fulfillment of the requirements
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Approved _____

Date 11/22/88

Acknowledgements

This thesis would not have been possible without my teachers, especially Dean Werner Seligmann, who supported me in doing something modest: housing. I am very grateful to my colleagues, Thomas Kinslow and Matthias Heidelberger, who provided stimulus and encouragement. Special thanks are due to Annette Linde, who assisted with the texts.

Contents

Introduction

Neither the post liberal city with their many small backyards, filled with dirt and stench, nor the modern city with their democratic green spreading out between the slabs, could satisfy their inhabitants on a long term basis. Whoever could afford it, bought a small free-standing house somewhere in the countryside, and commuted to work, shops, or the theater in the city.

Today, we find scattered houses all over the landscape in the western hemisphere. Not only concerned environmentalists but also sensitive architects compare this situation to a malignant tumor. Perhaps it is because the shrunken villas in the park cannot satisfy the needs and demands of their occupants. The outdoor spaces are too small to guaranty real privacy, but cause, on the other hand, long commutes for the inhabitants as well as a large infrastructure. In order to go to work, school, shops, recreational or cultural events, one must have a private vehicle.

High quality city dwelling units in a dense structure of public streets, squares, parks and private or semi-private outdoor spaces could be an alternative to the endless suburbia.

0.1 Suburbia in Chicago

Introduction

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0.1 Suburbia in Chicago

Goal and Guidelines

The goal of this thesis is to propose modifications of existing modern housing prototypes so that they could be used in classical, dense urban structures.

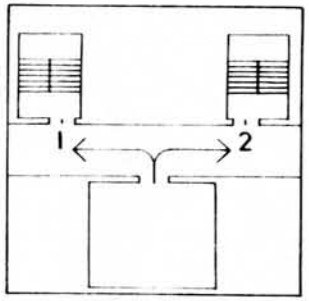
A few guidelines should help to limit the design solutions. Simple volumes, with not too fancy stepbacks, should clearly define a public space. The prominent street facade should be memorable. The entire building as well as each individual unit should be expressed on the facade. The backside and the roof should provide a wide variety of private outdoor spaces for miscellaneous activities. The height of the building should depend on the technical limits of the use of hydraulic elevators, (about eight stories), as they are low in cost and easy to be installed.

Though the investigations are not on a specific site in a specific city, I will work with the "New York State Fire Prevention and Building Code" and the "New York City Zoning Resolution", and especially therein the "Quality Housing Program". From that will come some further limitations for the design.

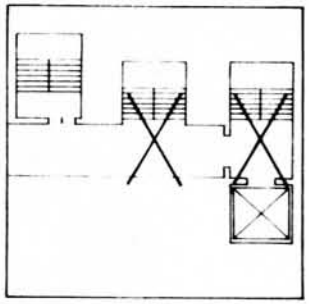
From the "New York State Fire Prevention and Building Code"

Following are a few regulations from the "New York State Fire Prevention and Building Code" which are more restrictive than the regulations of most European Codes:

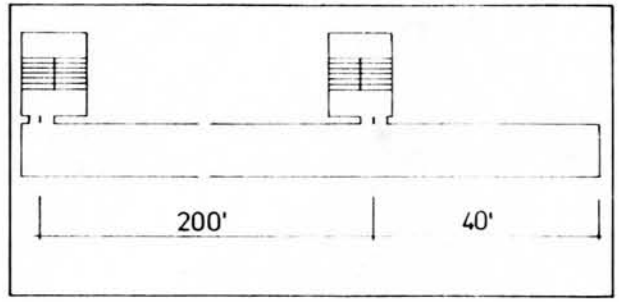
Each dwelling unit in multiple dwellings must have two means of egress.



Firestairs must be in an enclosed separate shaft; there will be only one door per landing.



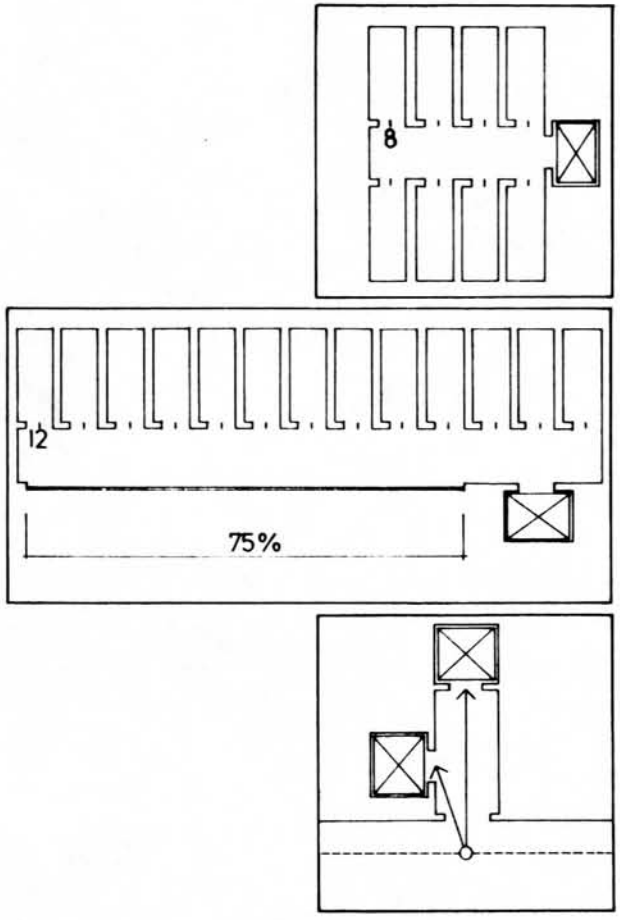
The distance between two fire exits cannot exceed 200 feet, unless sprinklered. Dead end corridors are permitted up to 40 feet.



From the "New York City Quality Housing Program"

Two sections of the "Quality Housing Program" ("Neighborhood Impact " and "Recreation Space") only make sense in a given site. Following are excerpts from "Security and Safety" and "Building Interior":

To increase familiarity among neighbors on each floor for better security, the number of dwelling units for each separate corridor shall not exceed eight. For a building where a corridor services dwelling units on only one of its sides and has either a transparent window or opening at least four feet high along 75% of its length, the maximum number of dwelling units serviced by one corridor shall be increased to twelve.



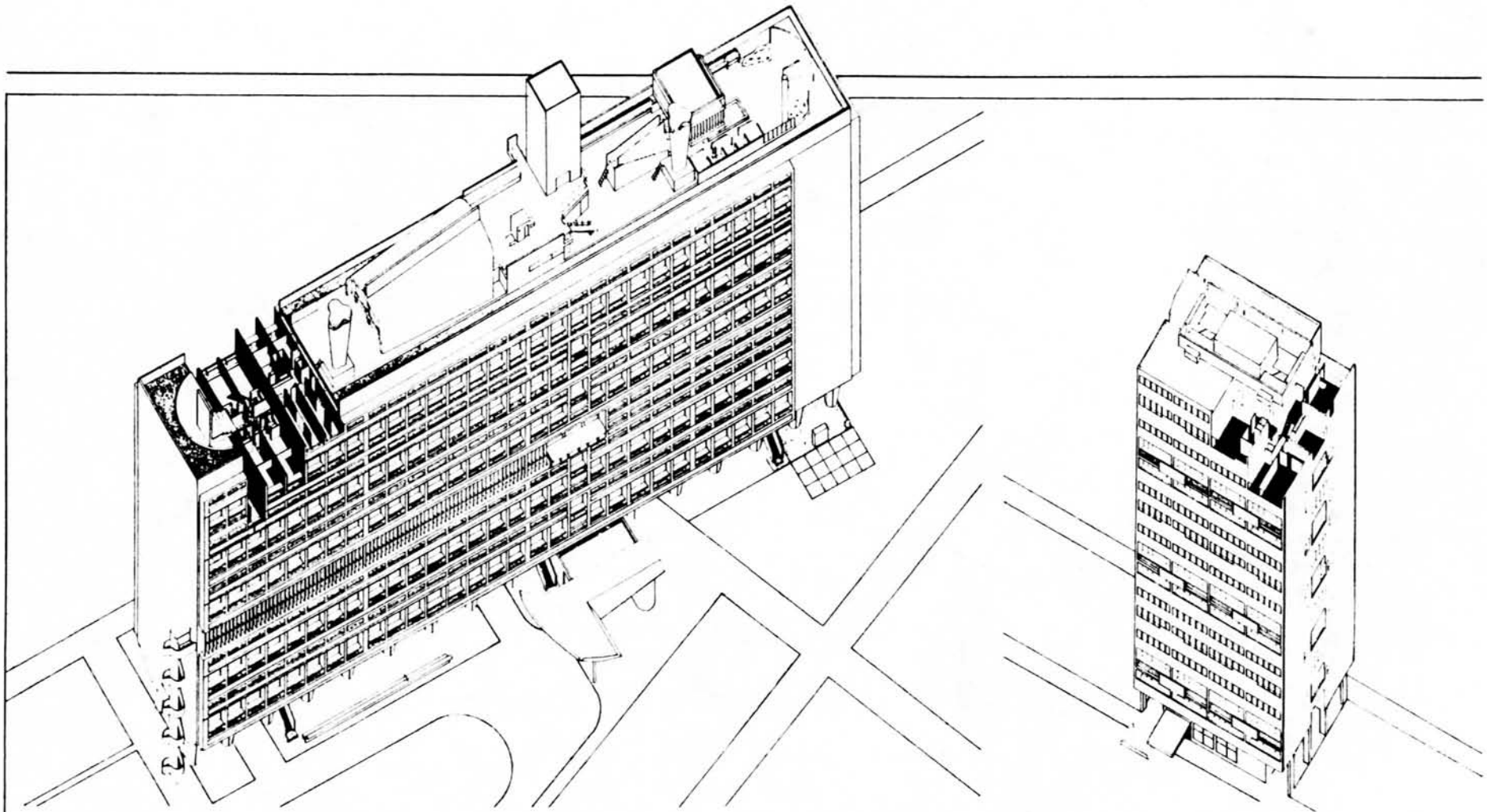
To insure visibility from the elevator to all dwelling units' entrance doors on a floor, the sight lines between elevators and unit doors shall be unobstructed.

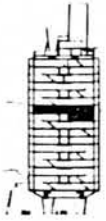
To create large, usable dwelling units accommodating a variety of lifestyles, the net square footage shall meet or exceed 650 to 900 net square feet.

To encourage natural through ventilation two windows with no less than one tenth the gross floor area of the room shall be located in separate rooms with opposite or nearly opposite exposure.

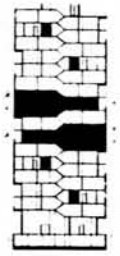
To permit elevator doors to be visible from the street and to remain visible upon approach from the street, the elevator door shall be visible from any single point at the intersection of the street line and the path to the main lobby.

To make the circulation spaces within the building more attractive and more secure, there shall be one square foot of window for every thirteen square feet of building corridor floor area.

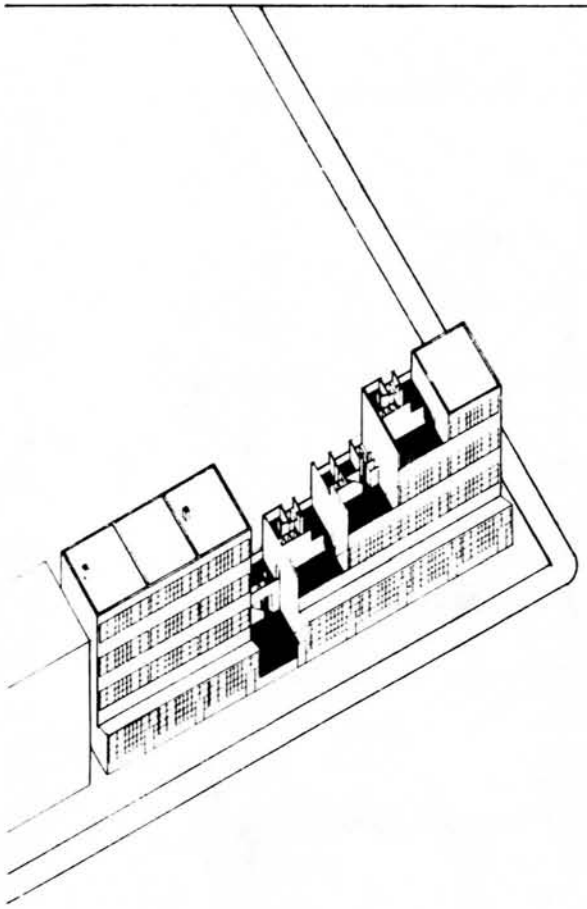


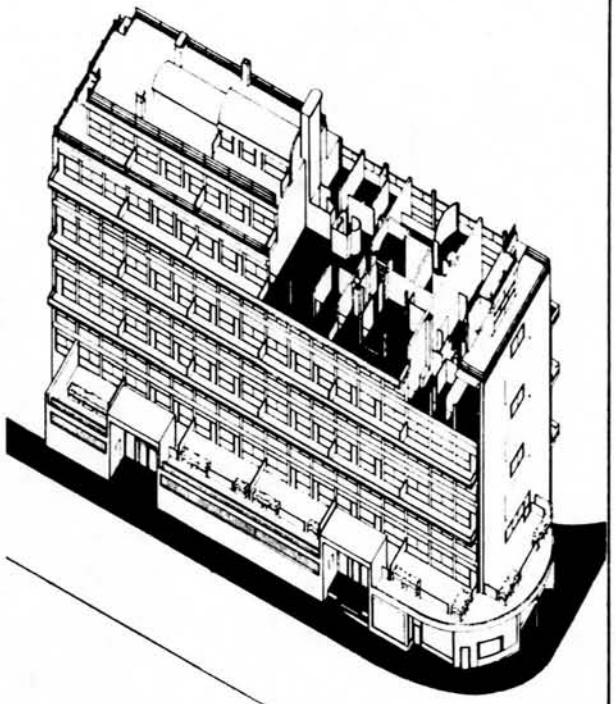


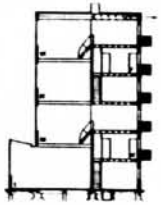
0.2
Unité d' Habitation
axonometric
section



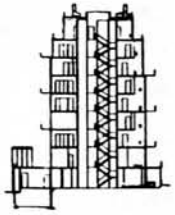
0.3
Hansaviertel Tower
axonometric
section







0.4
Zomerdijkstraat Atelier
Apartments
axonometric
section



0.5
Immeuble Clarté
axonometric
section

Precedents

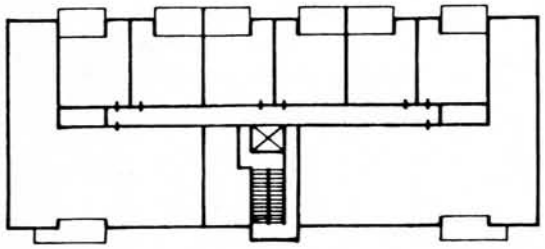
In a first step I tried to develop entire buildings, modifying ideas from precedents like Immeuble Clarte in Geneve by Le Corbusier, Hansaviertel Tower in Berlin by J.H. van den Broek and J.B. Bakema, Unité d' Habitation in Marseilles by Le Corbusier, Zomerdijkstraat Atelier Apartments in Amsterdam by P. Zanstra, J.H.L. Giesen,and K.L.Sijmons.

Building Types

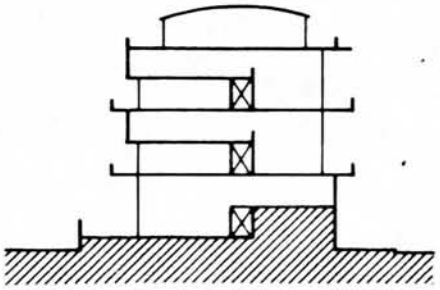
The main difficulty was always to achieve an optimum ratio of floor area for circulation to floor area for housing by increasing the number of units to the maximum of eight (or twelve provided the corridors are naturally lit) while at the same time providing through ventilation for all apartments.

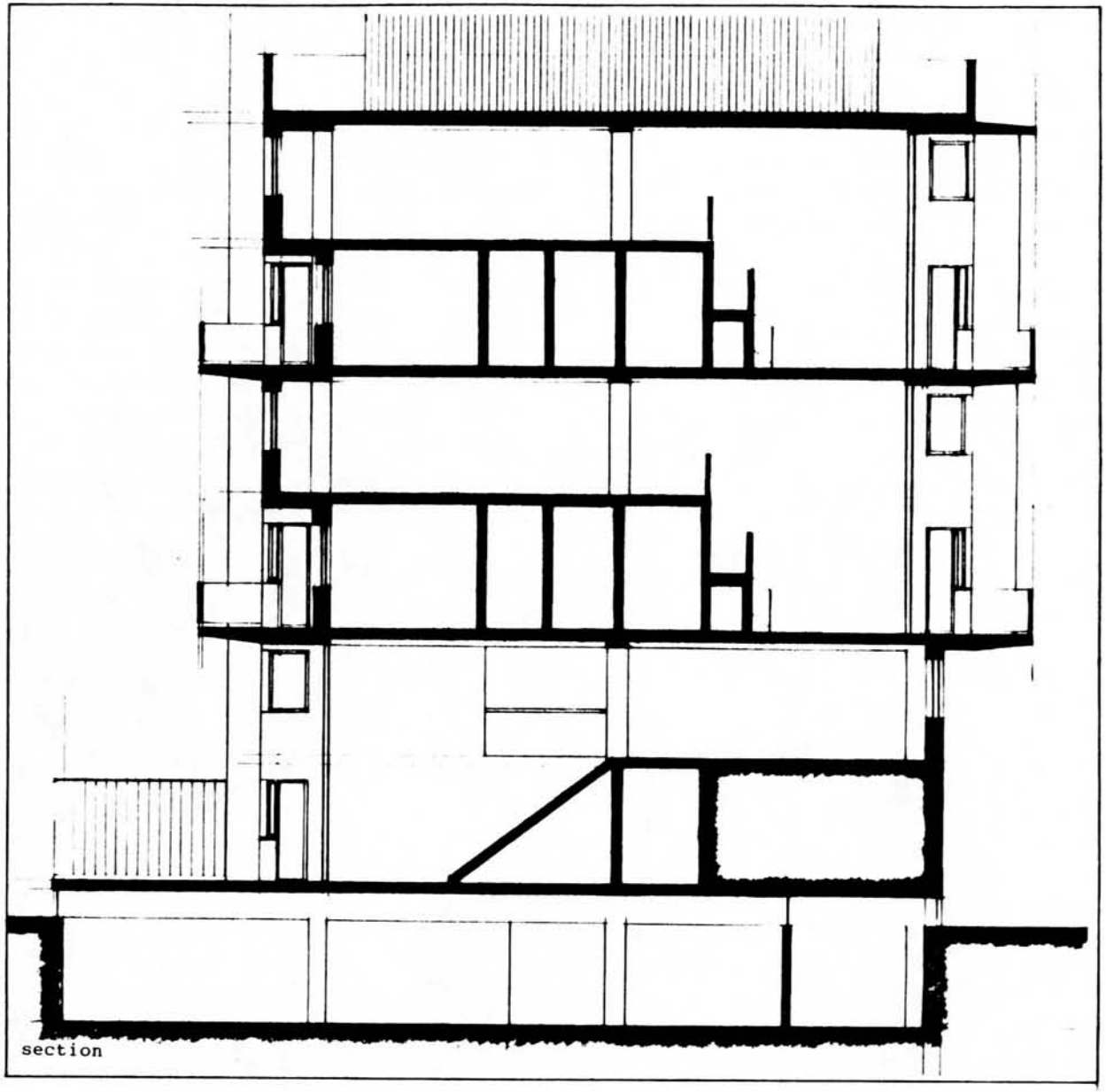
To provide a logical reason for prominent windows on the street side, I tried to place a large number of double-story spaces facing the street. Some of the building types are shown as follows:

Interior Corridor Every Second Floor

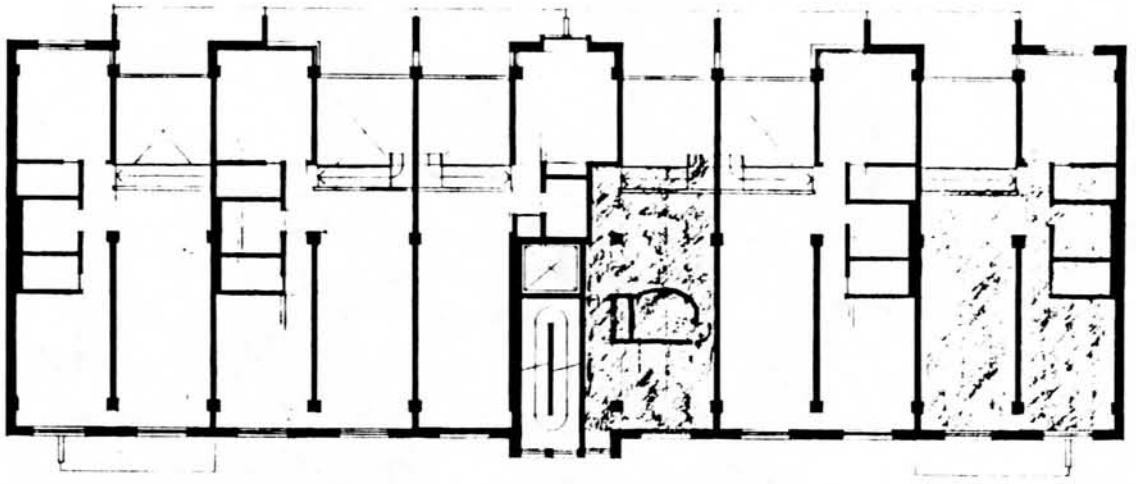


The whole circulation (elevator and two firestairs) are located in the middle of a double-loaded corridor . The length of the corridor is limited by fire code to 40 feet on both sides of the firestairs. Eight apartments is the maximum given the restrictions of the "Quality Housing Program". Flats with three or four bedrooms frame duplexes with up to two bedrooms. In the street facade a series of small windows would frame the larger openings of the duplexes. Stores on the first floor and special apartments in the attic would make a classical approach possible in the design of the facade.

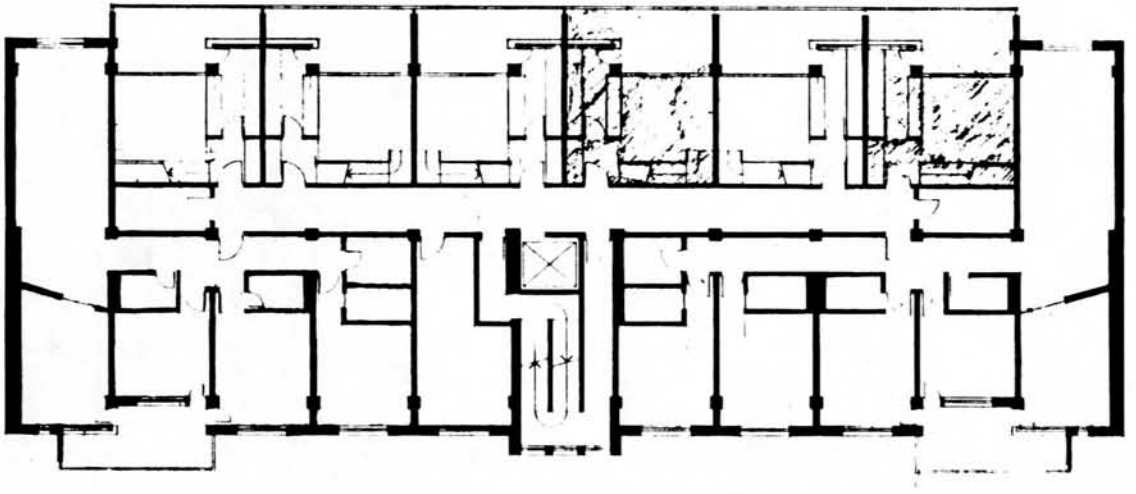




section

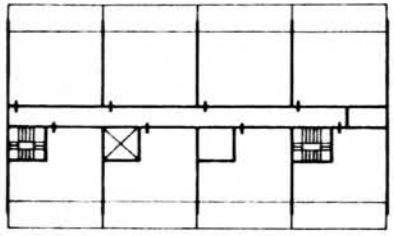


typical floor
upper level

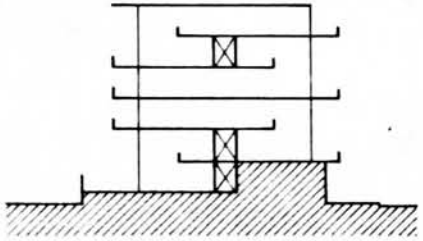


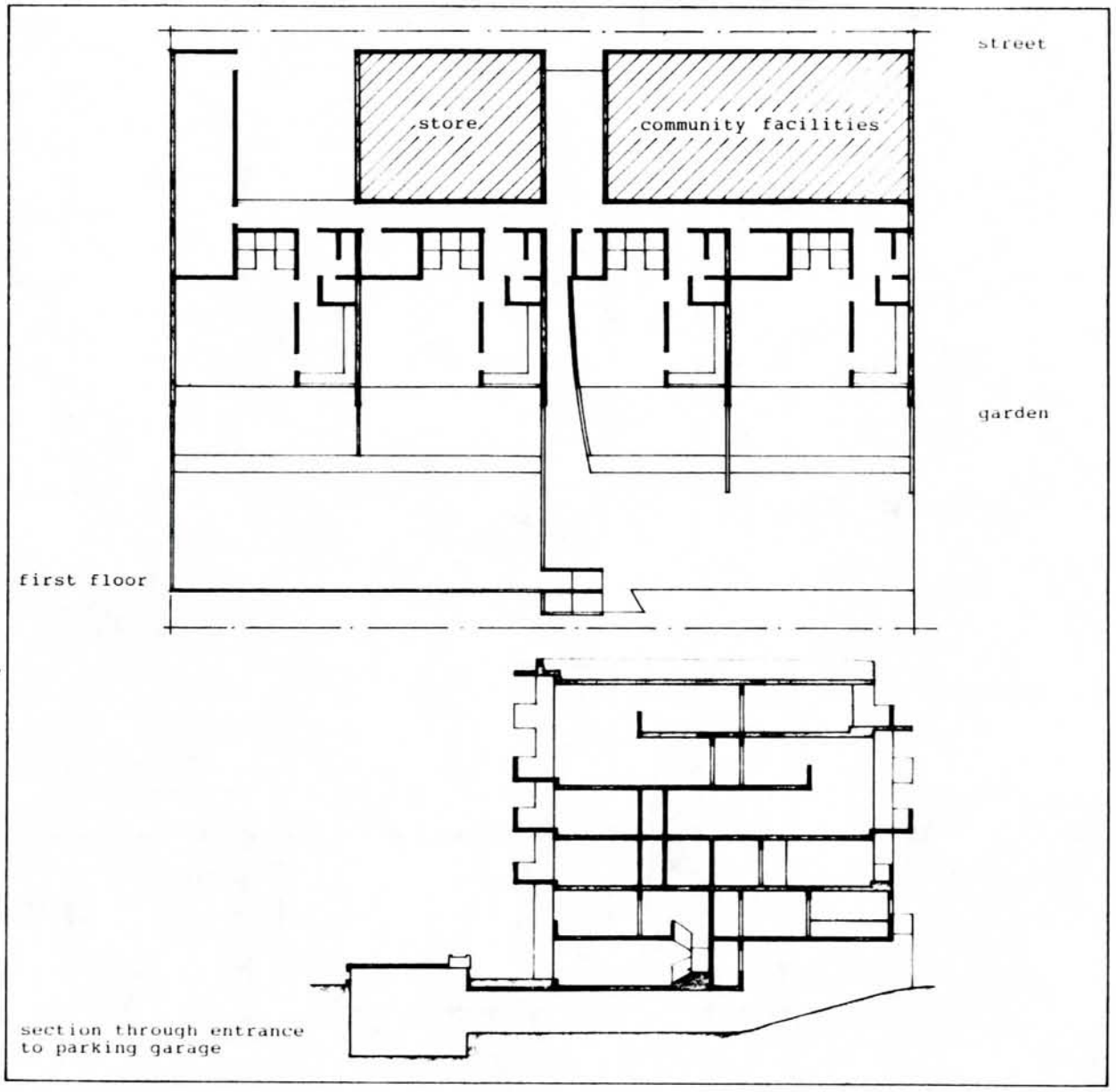
typical floor
lower level

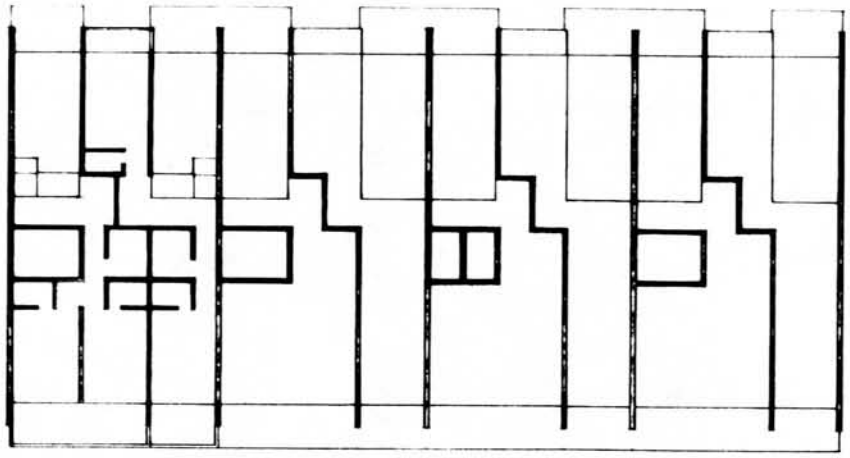
Interior Corridor Every Third Floor



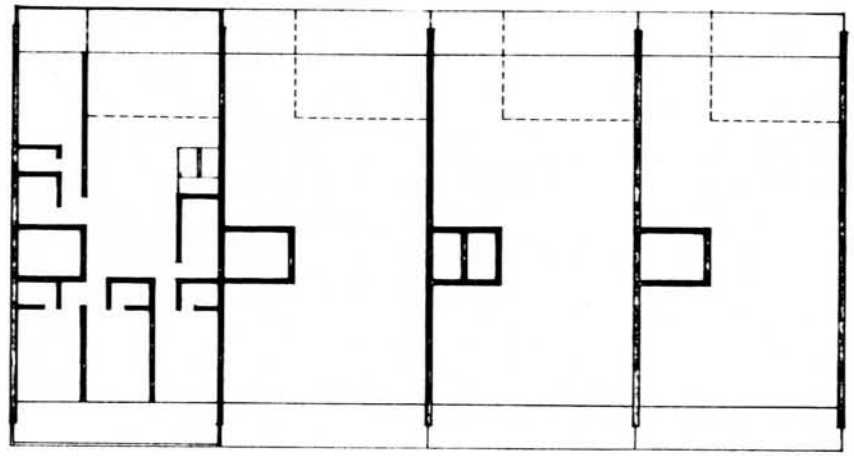
Working with the idea of interior corridors every third floor, the awkward situation of walking up to go down into an apartment must be solved. This is accomplished with a hallway on the first floor separating the stores facing the street from the duplex apartments facing the private garden. In plan, the entire building is composed of four equal blocks with one interior shaft for either stairs, elevators, mechanical, or waste deposits.



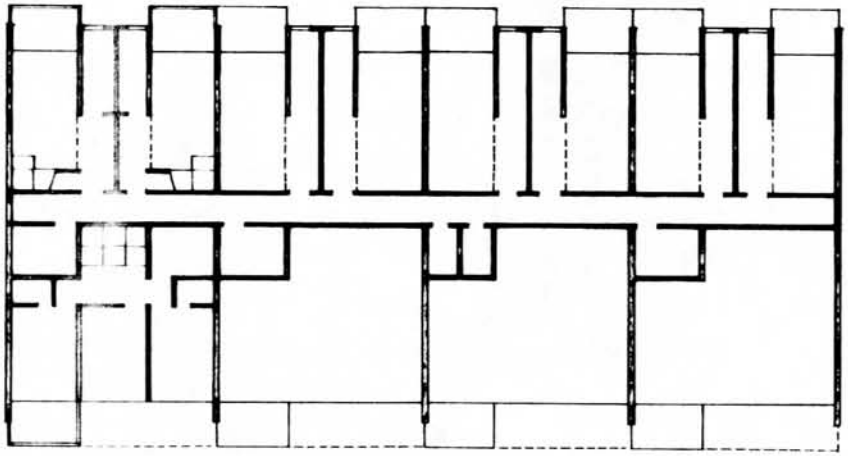




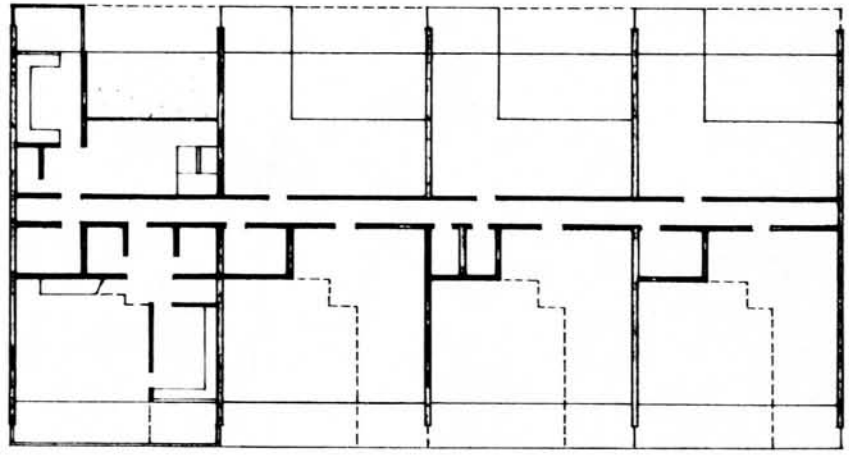
third floor
upper level of
small apartments



fourth floor

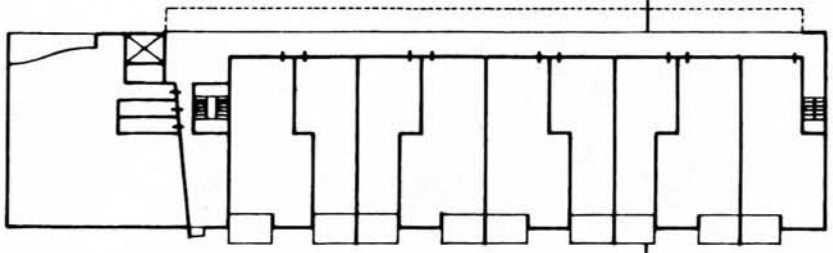


second floor
entrances to
small apartments

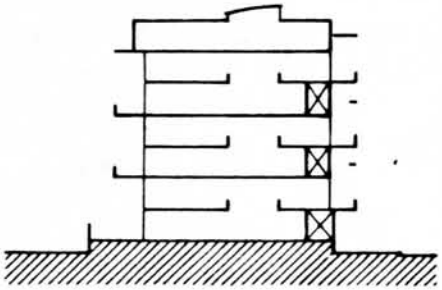


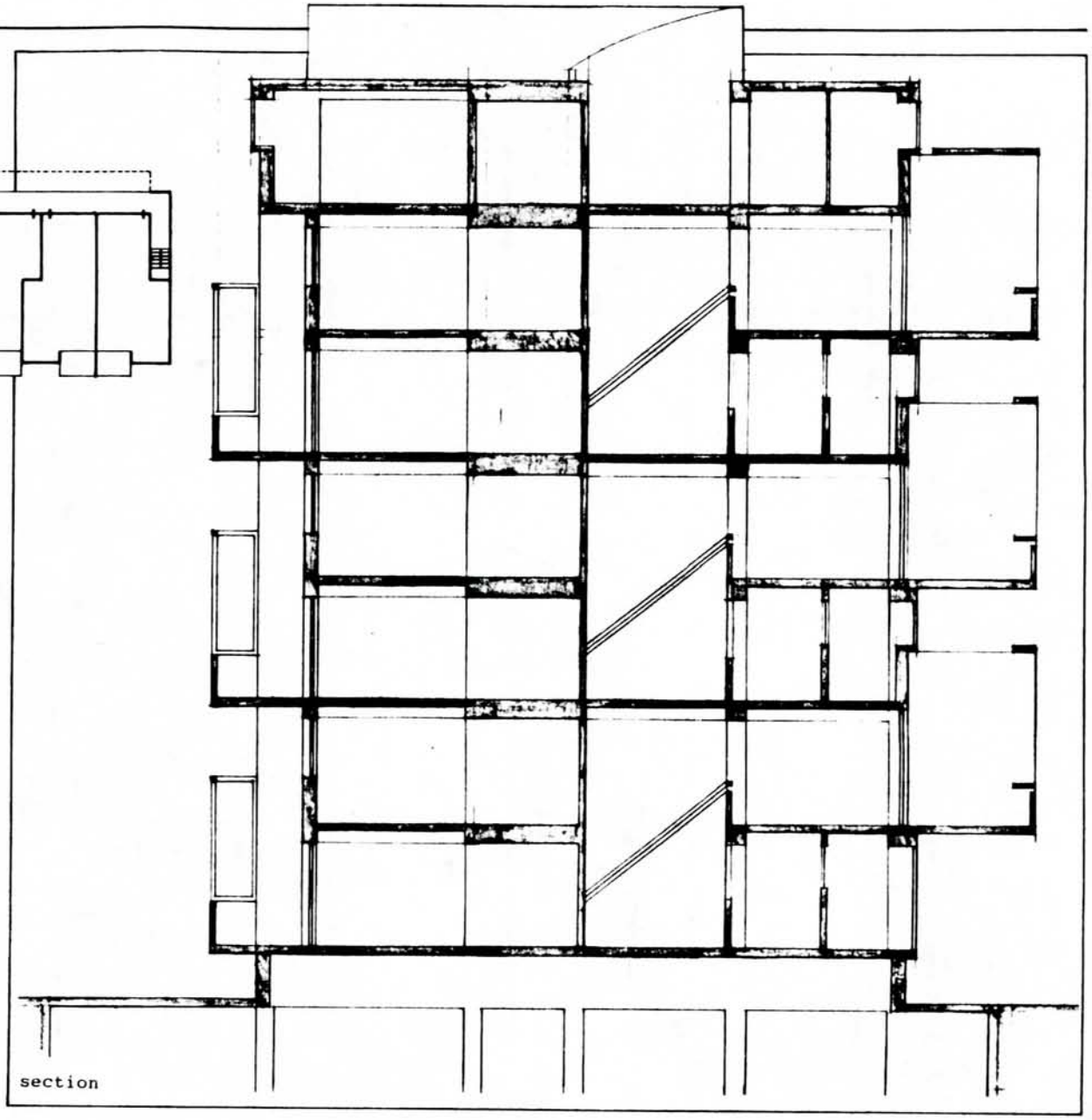
fifth floor
interior corridor

Exterior Corridor Every Second Floor



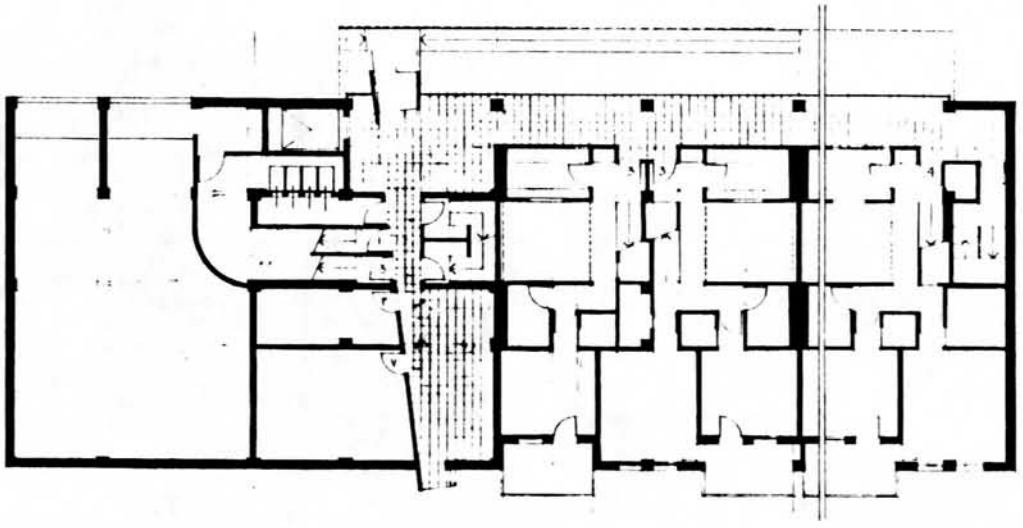
The main stairs, elevator and one flat are organized as a head of the building. The body of the building consists of up to ten duplexes every second floor, having the kitchen next to the exterior hallway, underneath the living room gallery, a double-story dining area in the middle of the unit and bedrooms facing the courtyard. The firestair is located at the end of the hallway. The street facade is divided into two parts, one part being the entrance and the other being the duplexes.





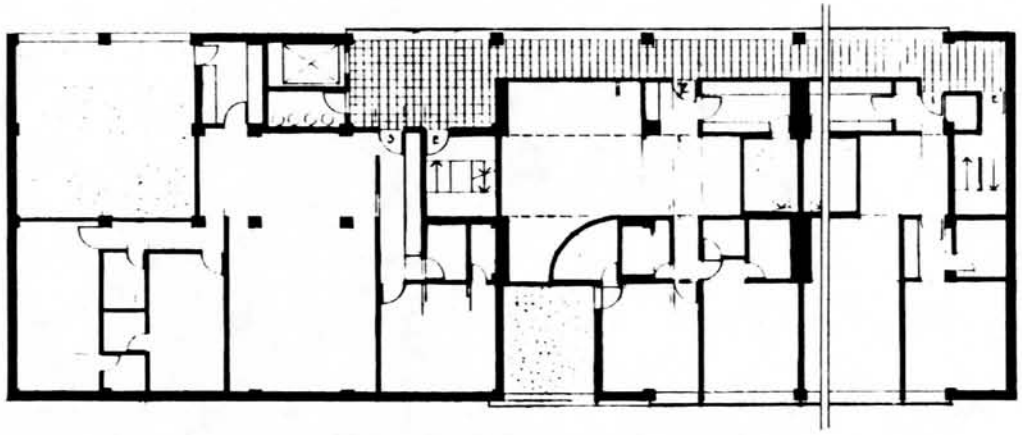
section

second, fourth and
sixth floor



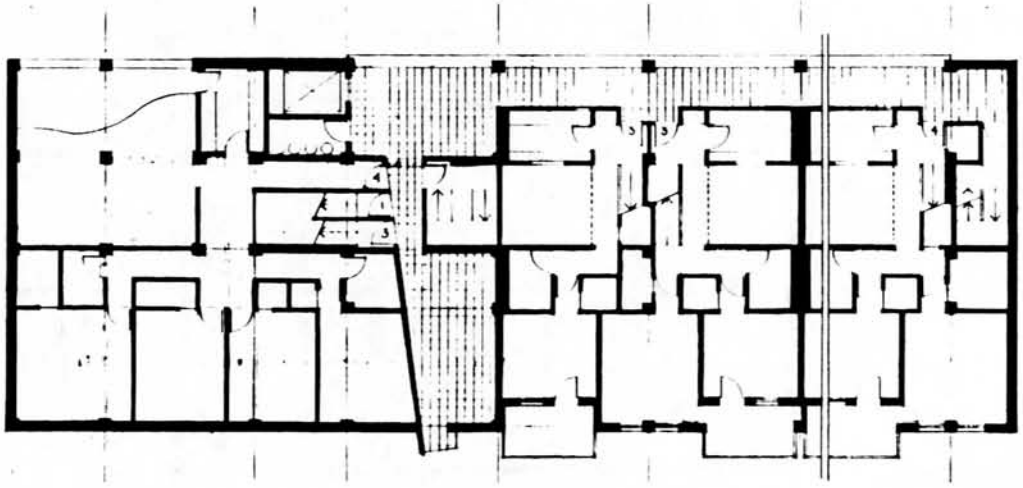
first floor

street



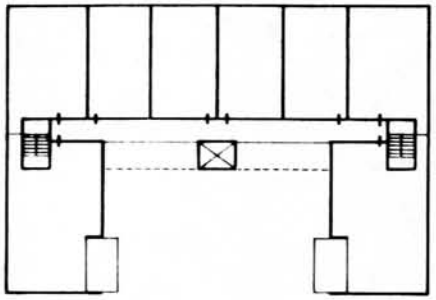
top floor

garden

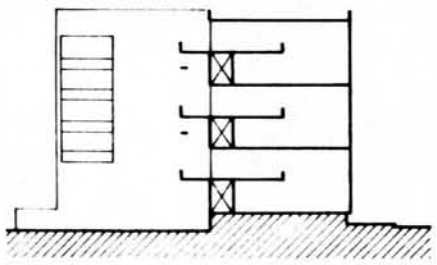


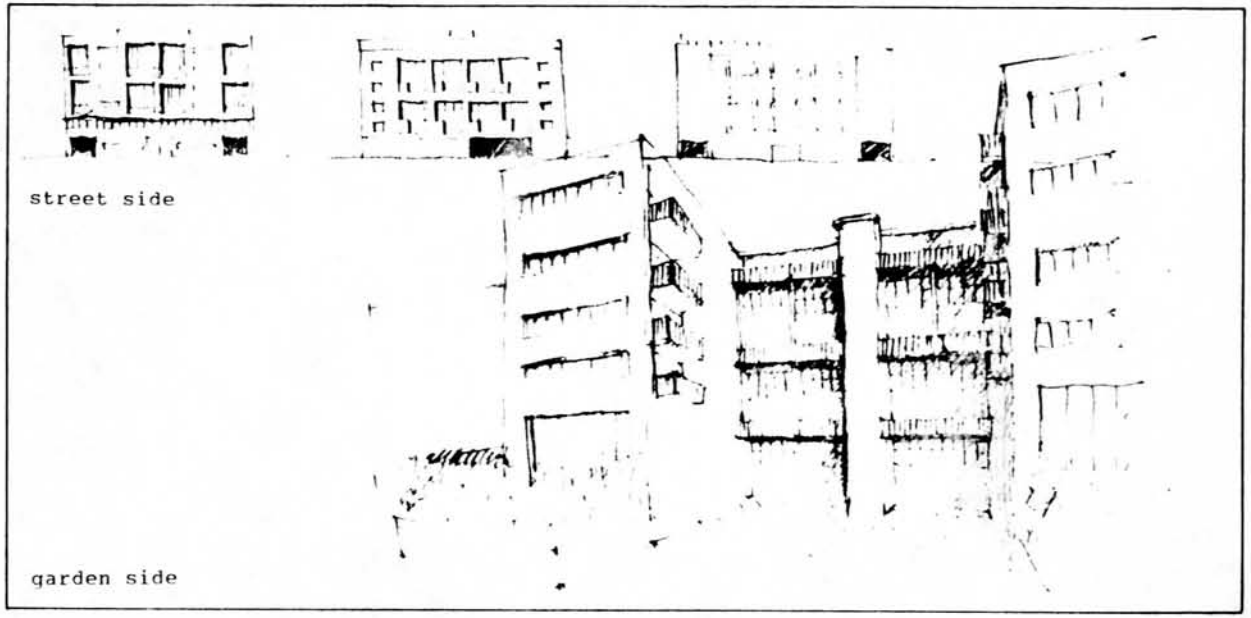
third and fifth floor

Exterior Corridor and Split-Level Units

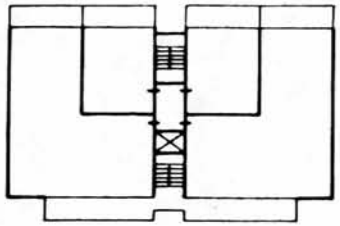


A variation of the previous type accommodates deep lots. Flats are located in the corners and duplexes in the middle, organized around an inner courtyard providing through ventilation for almost every apartment.

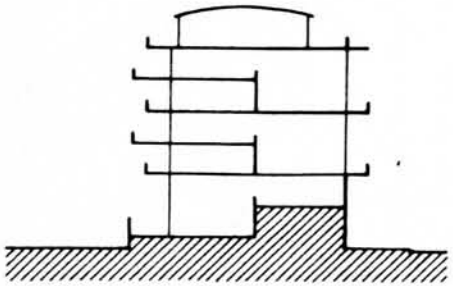


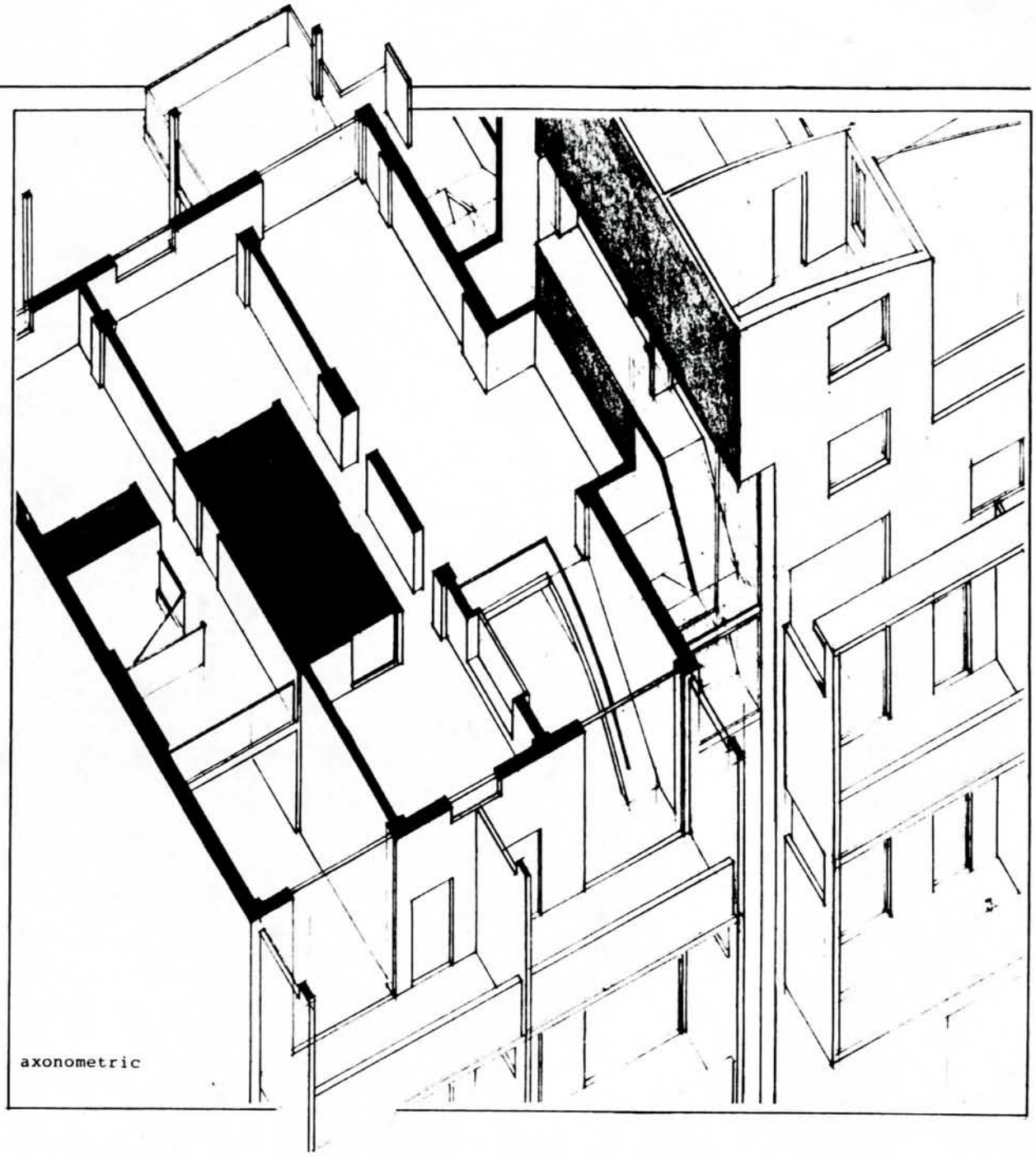


Four Apartments Every Second Floor

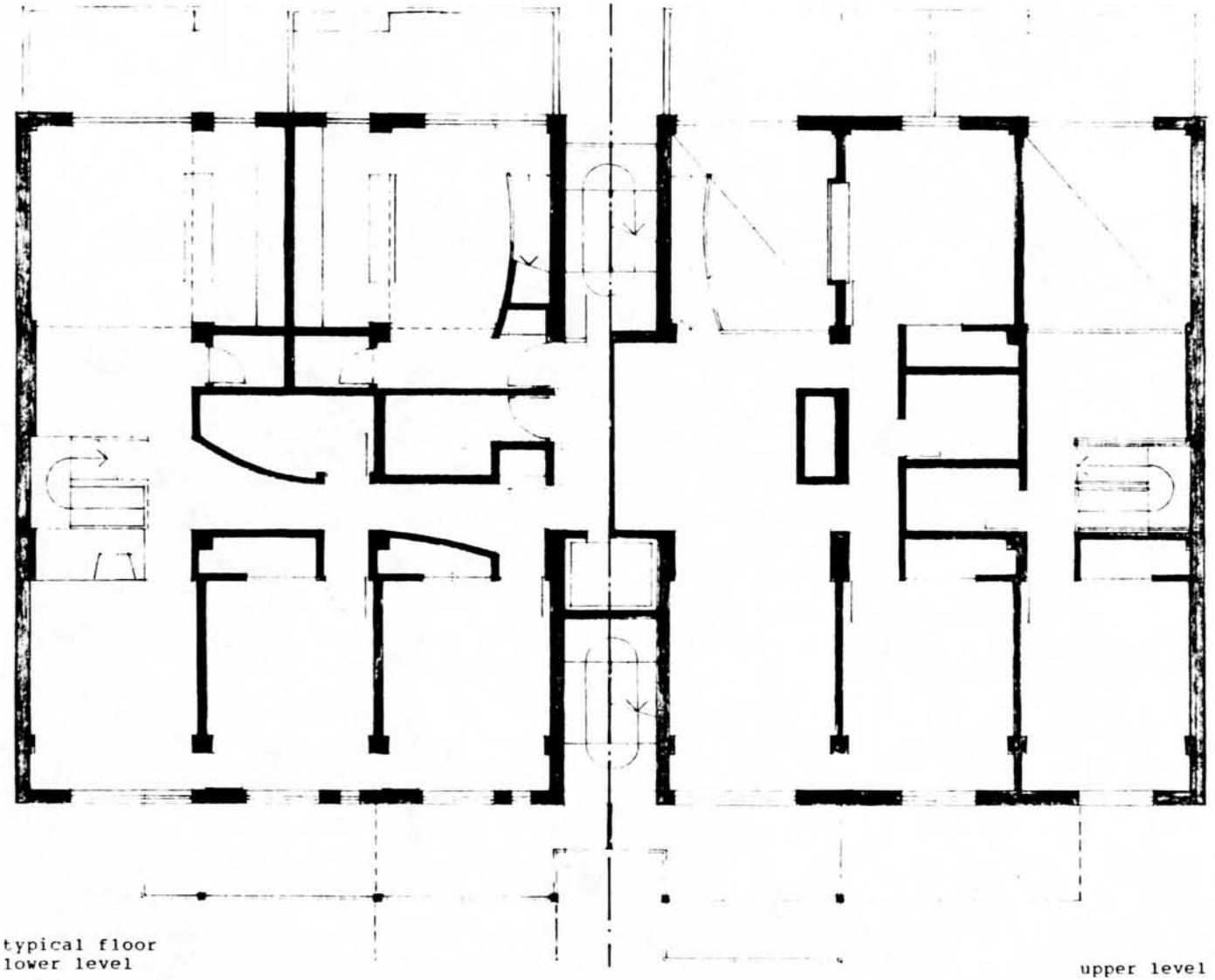


A small apartment house with two units per floor, is arranged so that all units have a double-story living room towards the street and access to the fire-stair in the back from the balcony. The street facade is divided into two equal parts symmetrical about the staircase.





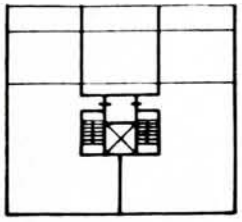
axonometric



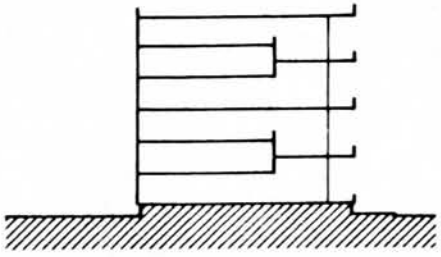
typical floor
lower level

upper level

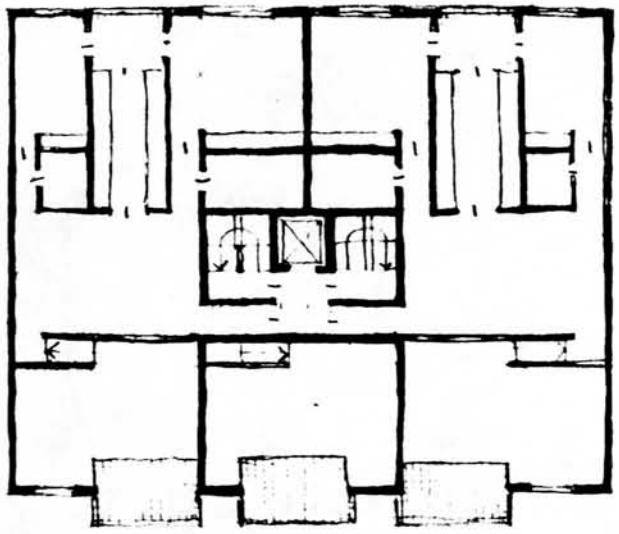
Split-Level Apartments of Equal Size

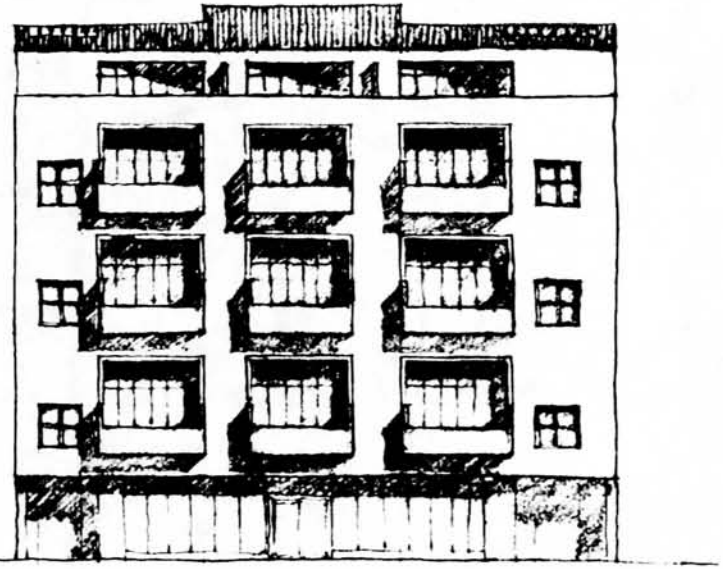


Another attempt to provide higher spaces within a small apartment house with two units on each of the six floors works with one and a half story living rooms on the street side and one story spaces on the garden side. To have equal conditions for all apartments, the twelve high spaces on four levels must be combined with the one story spaces on six levels in the back.



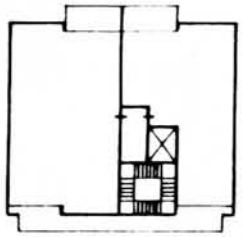
plan



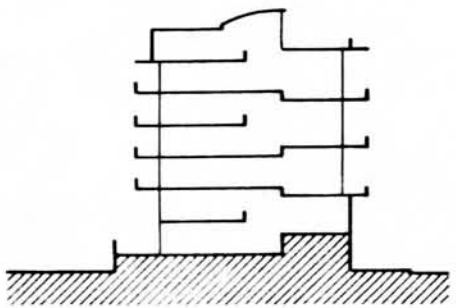


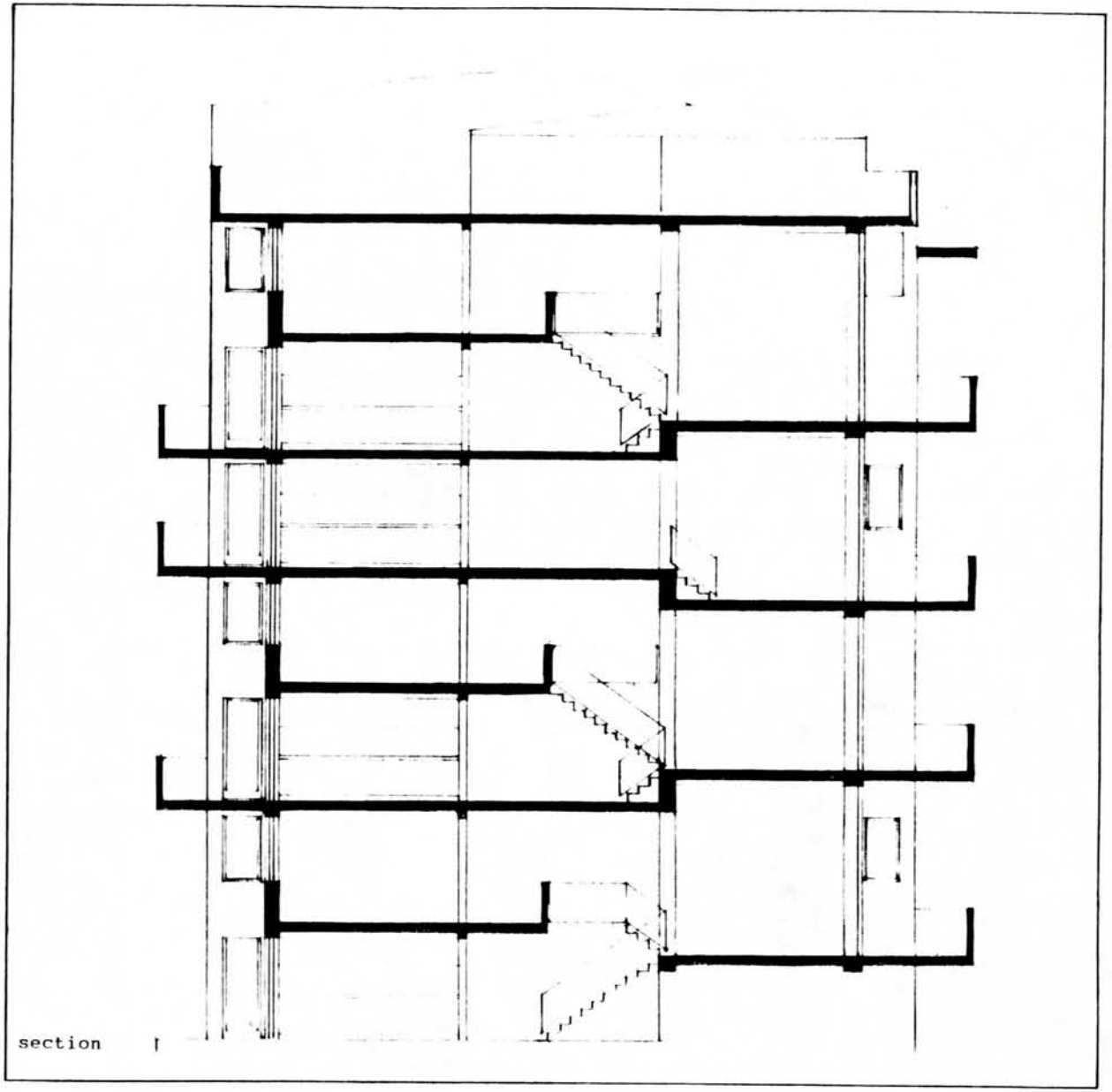
street facade

Split-Level Units of Different Sizes

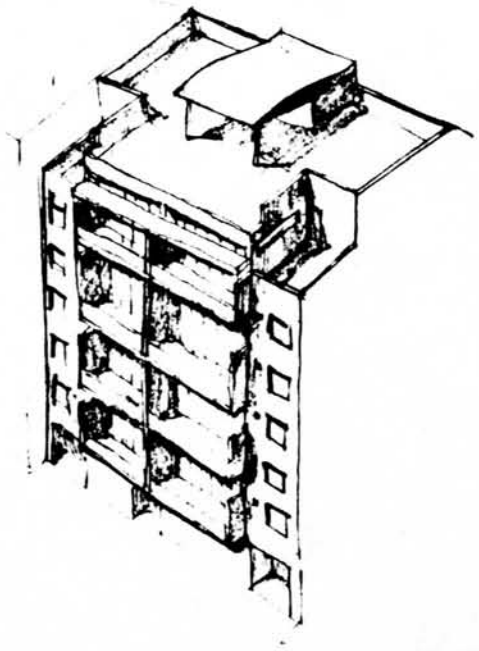


The final type is a variation of the previous one, but offers a wide variety of different sized units. They are spatially rich and can certainly be developed into good apartments. The whole building is quite small and can therefore easily fit into a narrow lot. At the same time it has the potential to be developed into a corner building with an addition in the back, so that it could be used in many different sites along the edge of a block.

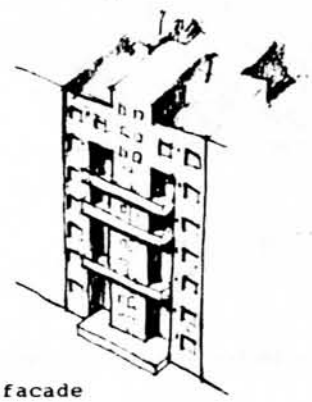




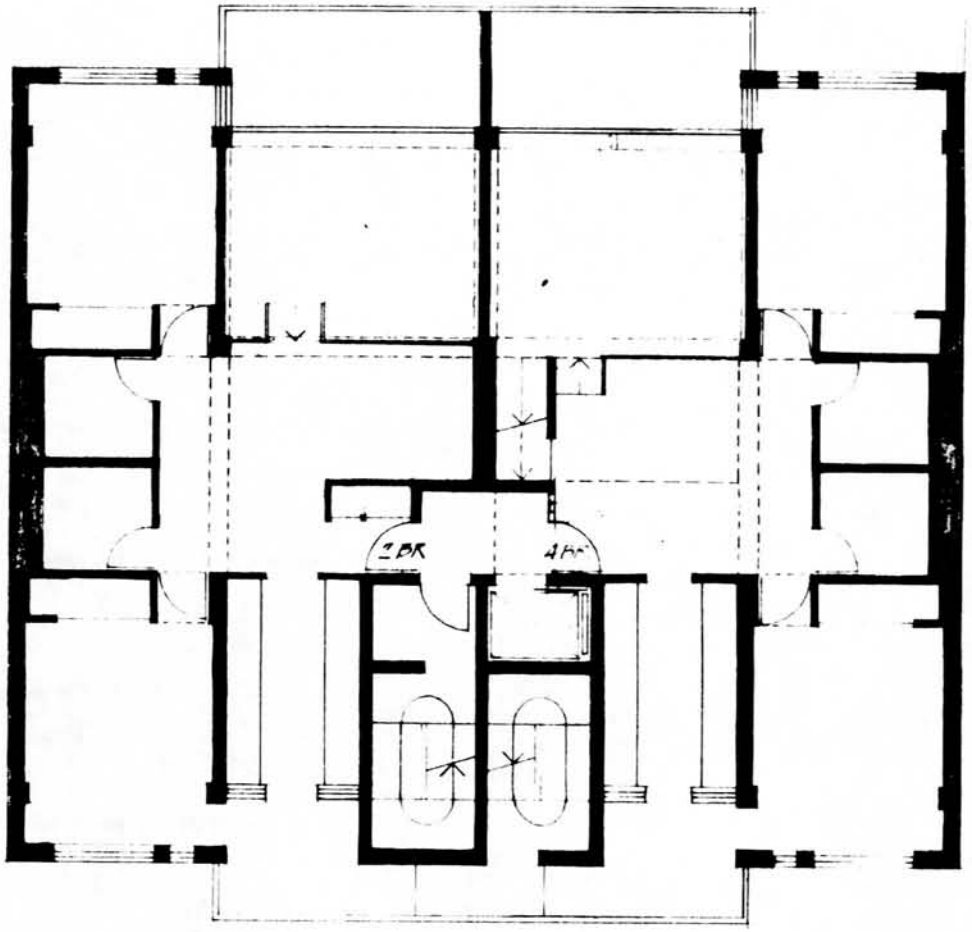
section



street facade

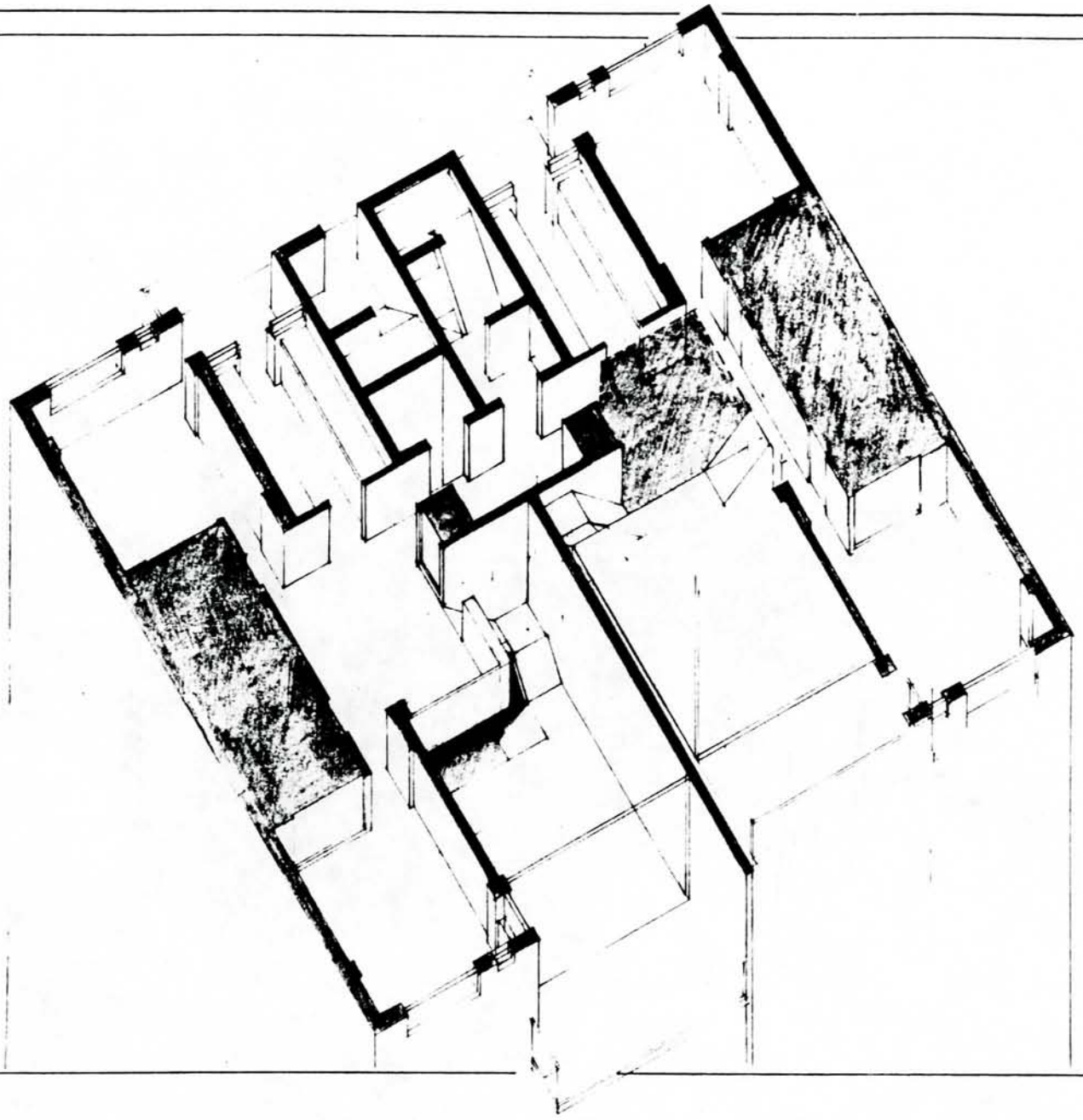


garden facade



small apartment

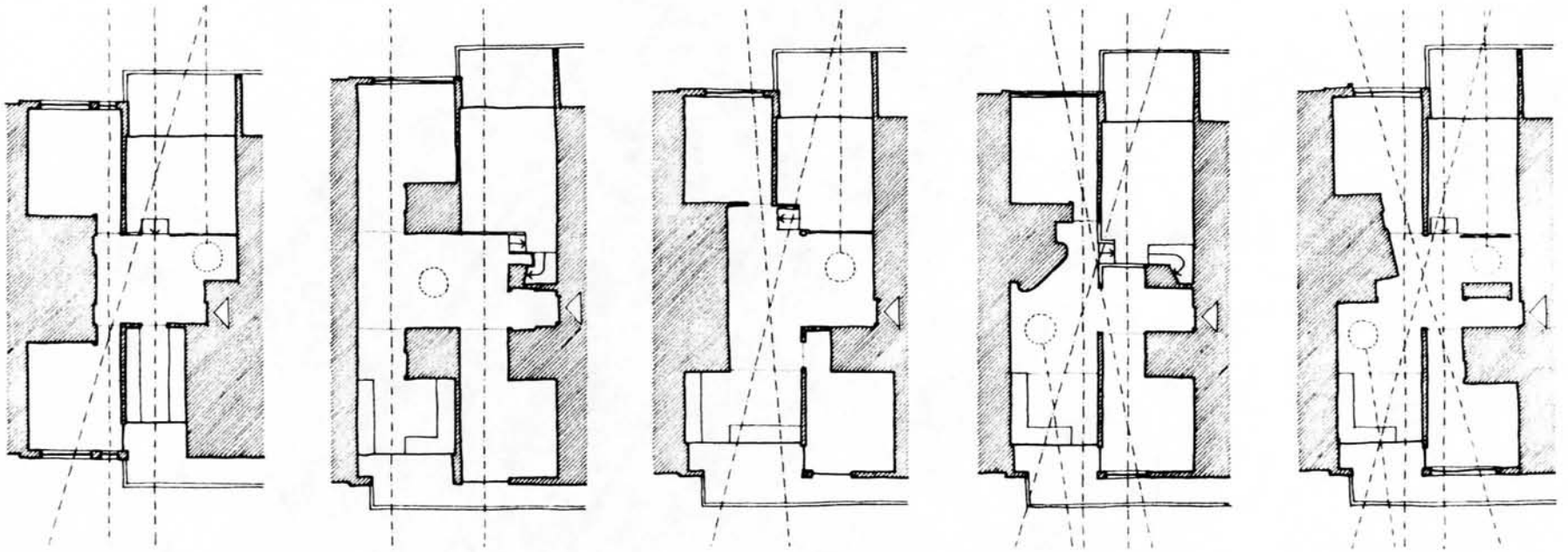
big apartment
lower level



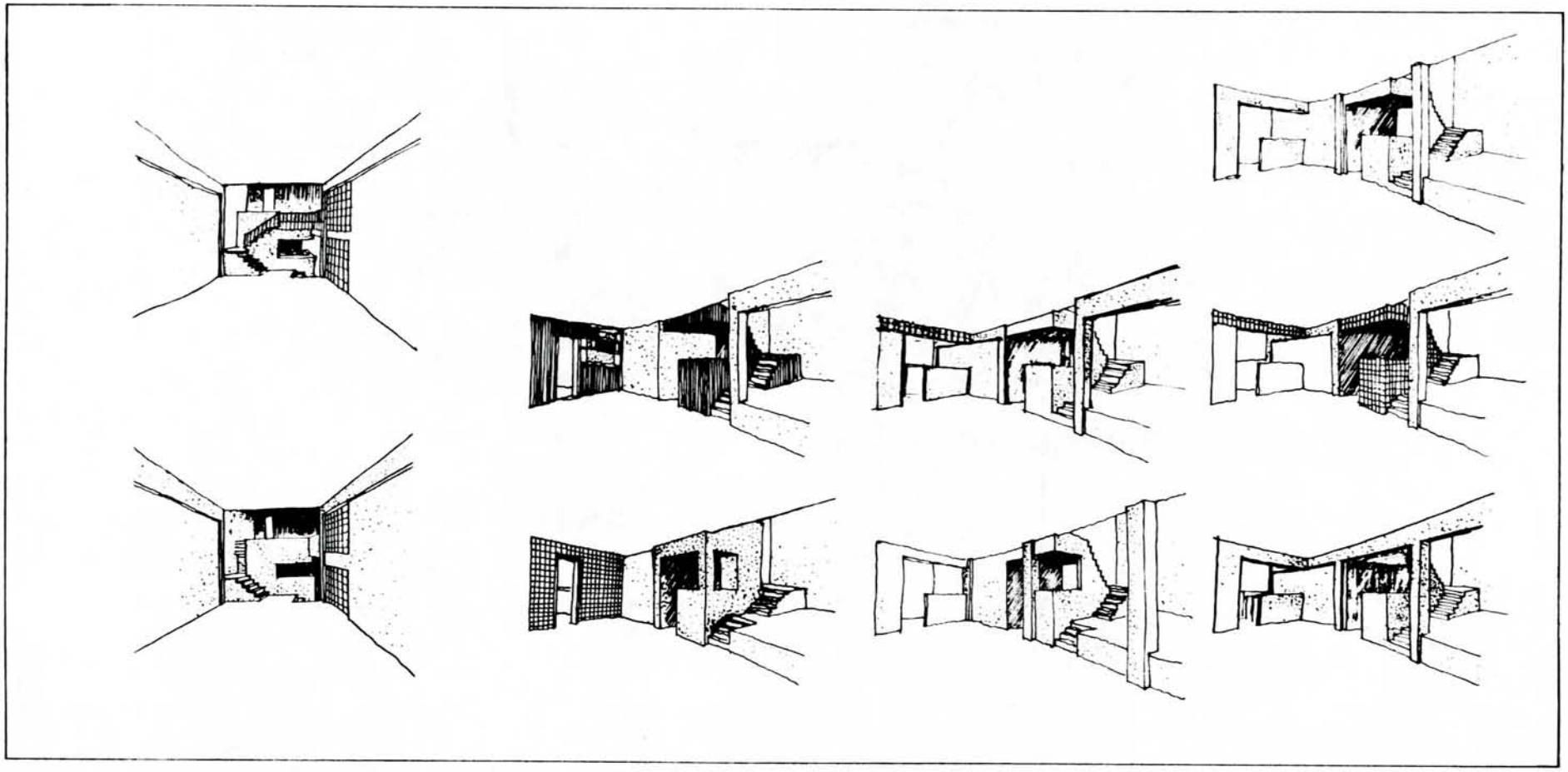
axonometric

Further Development of One Type

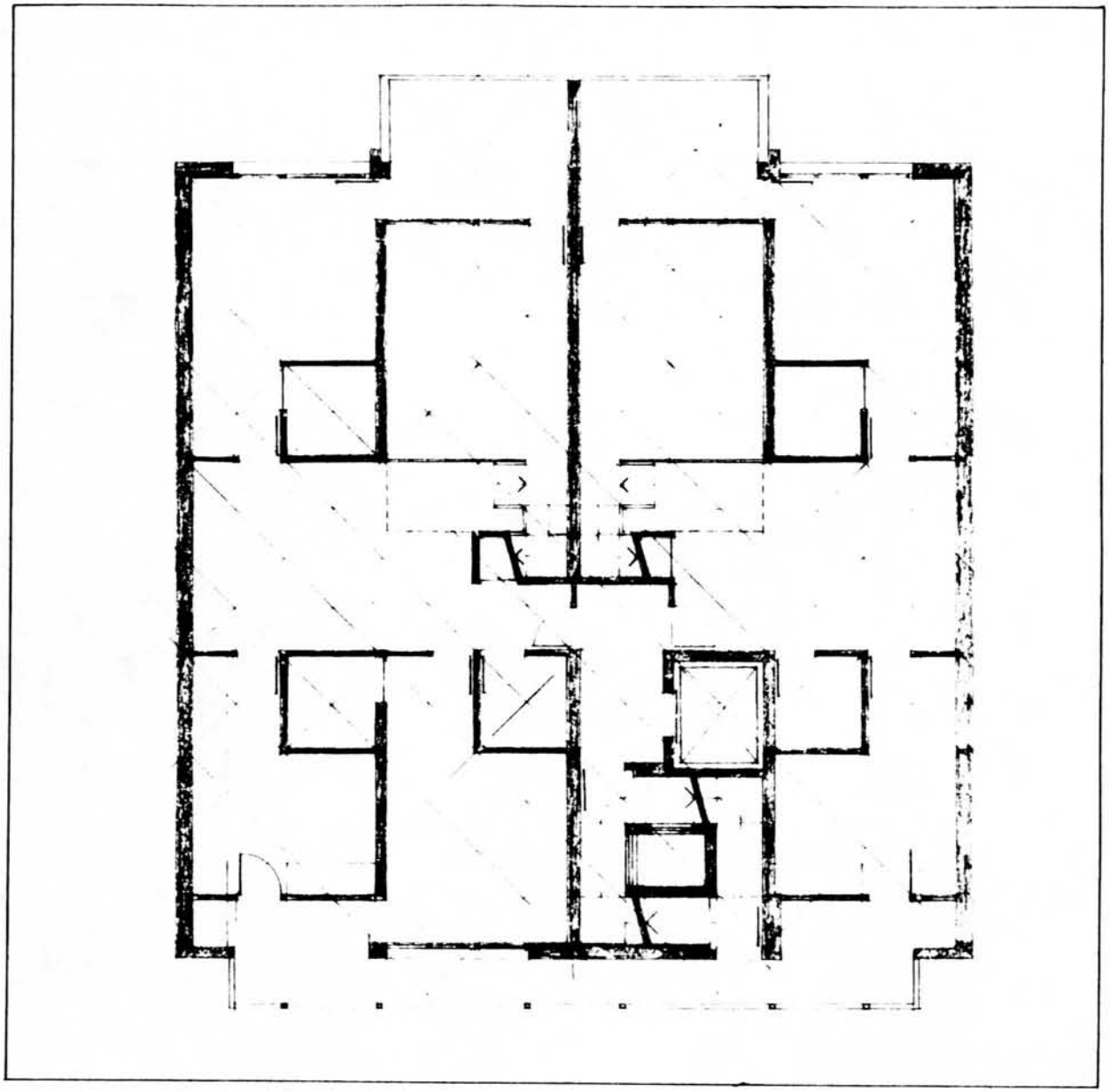
In further steps I tried to make the apartments look bigger by arranging the bathrooms and closets in different ways. Many through views should be provided, and spaces in the middle of the apartment should have at least one visible connection with the outside.

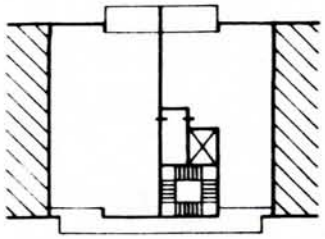


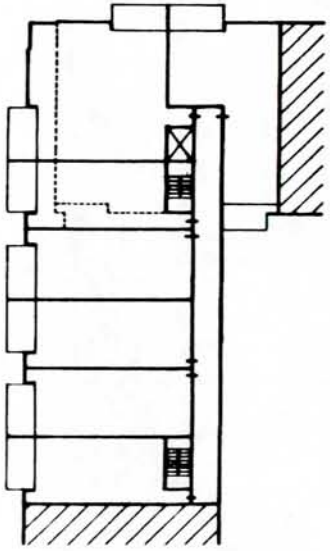
Several studies were done to achieve good spatial definition without losing the continuity of space.

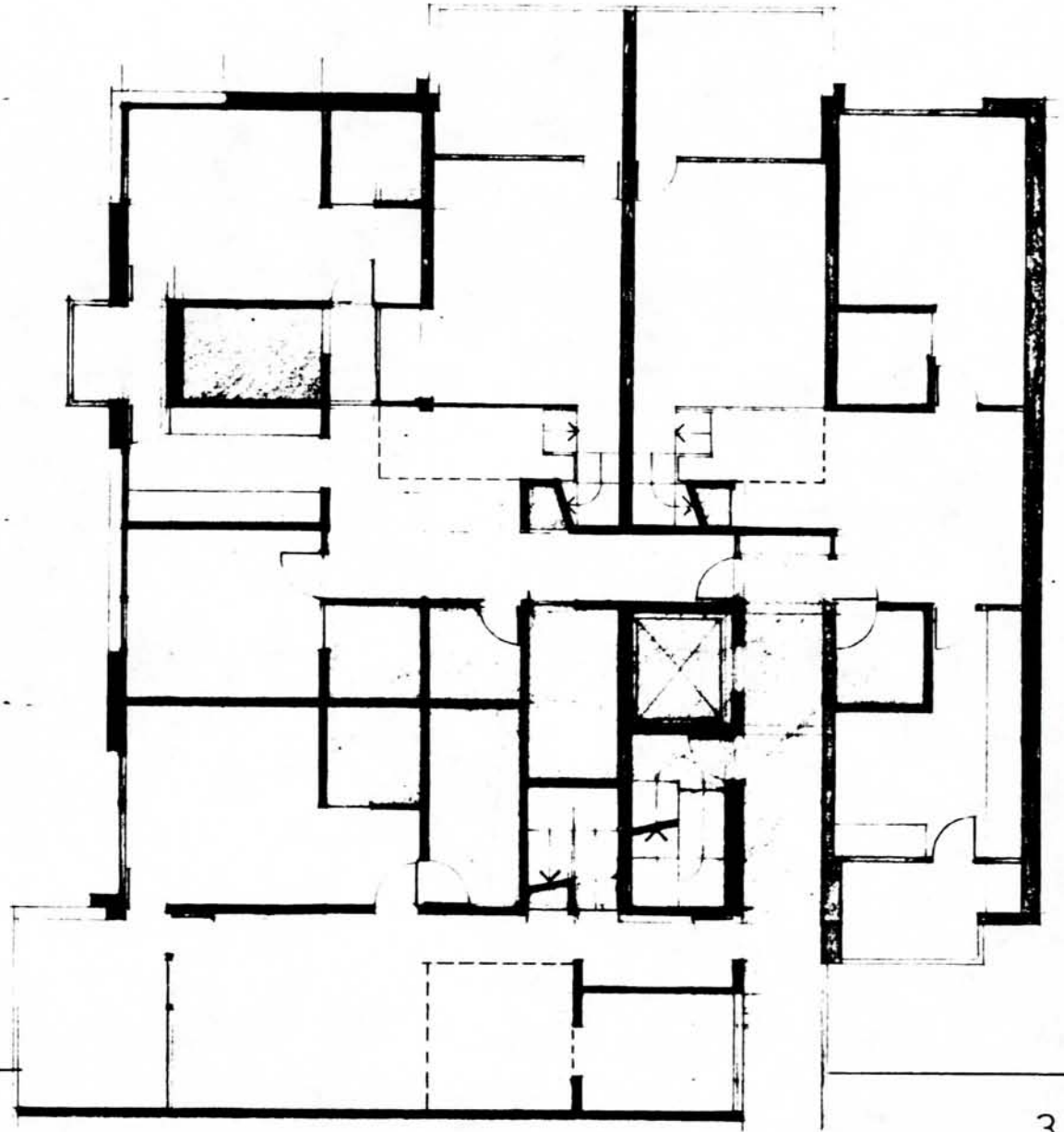


Another goal was to develop this type, on the back of which a duplex could be added.

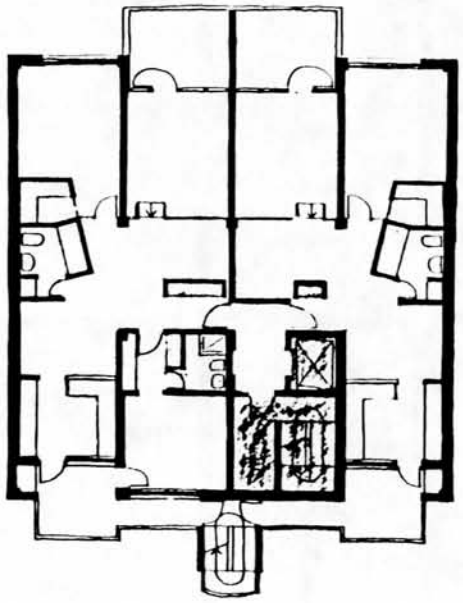




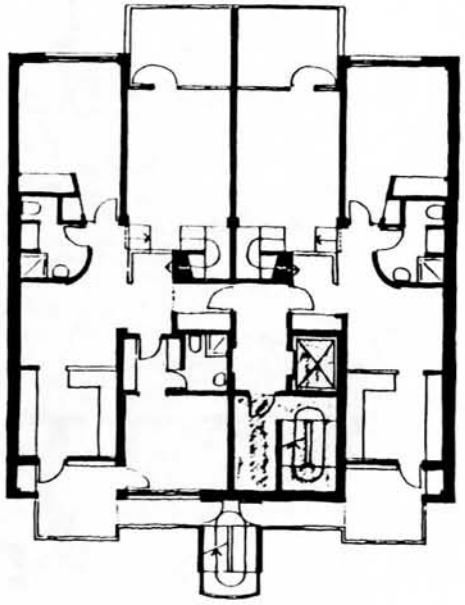




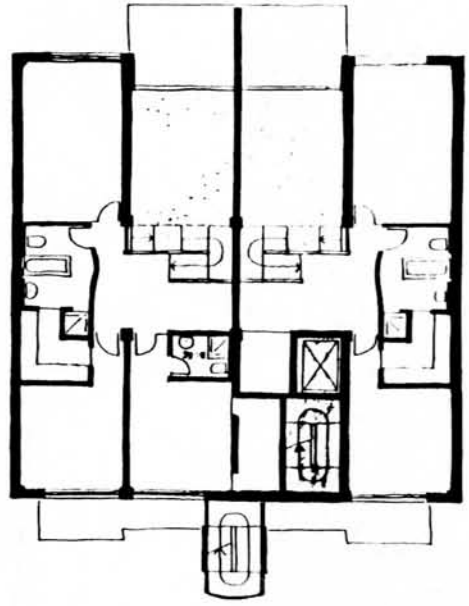
To control whether the street facade could meet the given goals, I developed one set of floor plans, variations of the section, and a series of street facades.



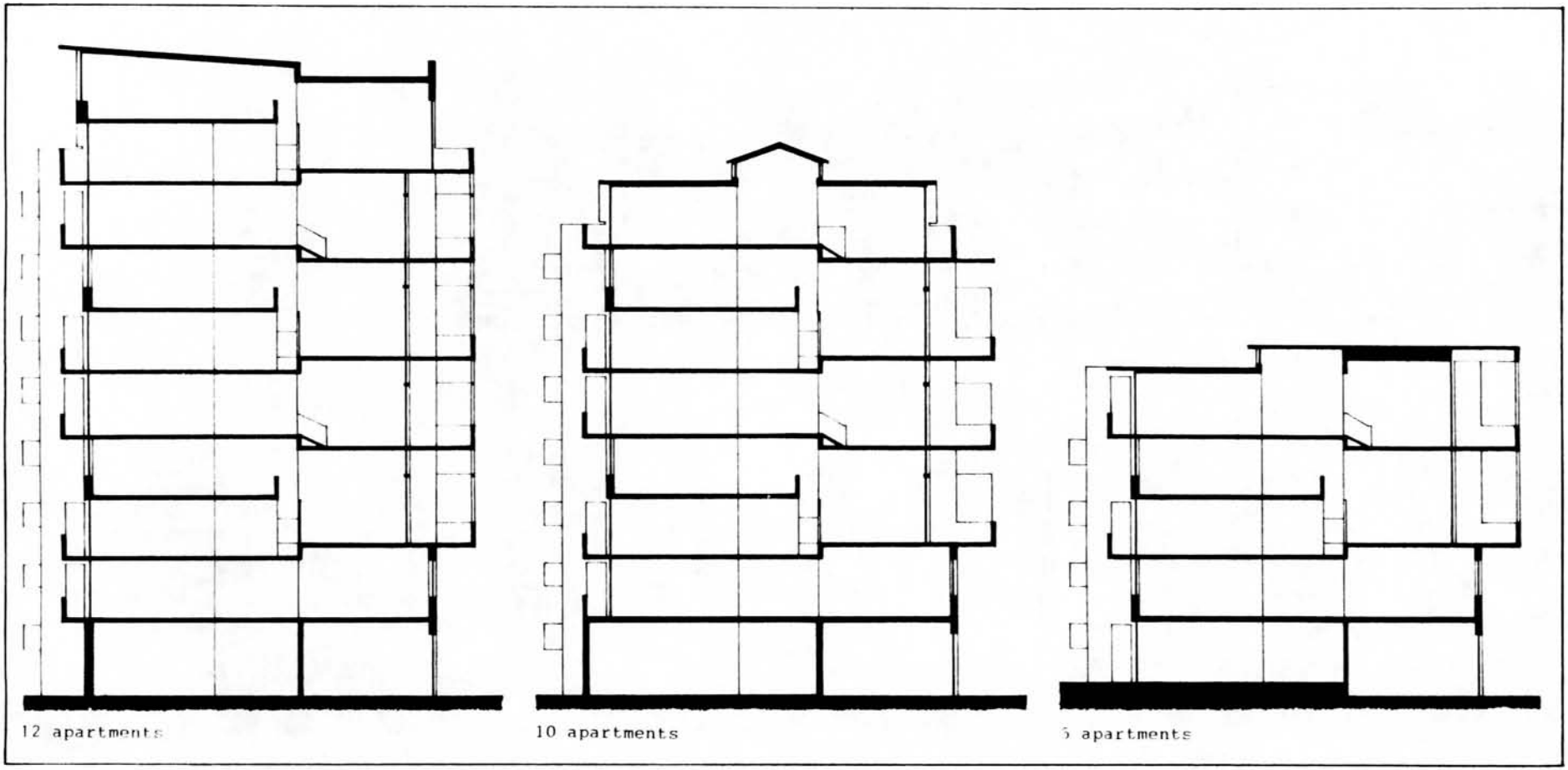
smaller apartments floor



bigger apartments lower floor



bigger apartments upper floor


12 apartments
10 apartments
6 apartments

Critic on the Building Types

At this point I stopped any further development of the building types; all of them meet most of the given goals. The apartments are varied and interesting. The street sides could be developed into prominent, memorable facades, the garden sides and the roofs could accommodate various outdoor activities. But just to have one room with a higher ceiling does not necessarily make the apartment a good one. In too many cases there are long hallways and dark, interior spaces. There are not many possibilities to individualize the existing apartment, other than to decorate it. The private outdoor spaces and the spaces for communication and interaction with the neighbors are limited. The buildings themselves are not easily adjustable to different sites.

"Light, air, and space" was a slogan in the 1920's which stood for modern living qualities. The demand for light and air originated in dense cities such as Berlin, Paris, and London after the turn of the century, and was a reaction to the small courtyards, light wells and "corridor streets". As a consequence, most building codes of today require sufficient light, air and minimal distances between the buildings. The demand for space had different origins. On one hand, there were the hopelessly crowded apartments for workers in the industrial cities. Requirements for minimal floor areas were established and research was done to make better use of minimal apartments ("Kitchen of Frankfurt", "Open Plan", etc). On the other hand, the change of the political and economical structures evoked a new perception of space; everybody in the new society would have a share in the common, universal space. The very old discrepancy between town and country would disappear, the modern city would become one big park. As a result, many cities lowered their floor area ratios, and new models for city expansions were elaborated. Not very many models were successful. The "park" is quite often just a parking lot through which gusty winds are blowing. These vast spaces are loosely defined by anonymous slabs. Our thoughts wander to Italian cities, to well contained public spaces within the "urban poché".

Most of the goals of the Modern Movement concerning the individual apartment have been fulfilled. The next task is to improve the basic properties. The minimal requirements focused on the quantity; the quality should be refined now. We are living in the "age of choice", ideally the occupant could control his environment: temperature, light, shadow, disturbance from outside and the space itself. The indoor space, the transition zones between the inside and outside and the use of the outside as a background for the apartment should be a source for a wide variety of different experiences (to stimulate fantasy and creativity or to help ease relaxation).

We should also go one step further and define a new set of key words like **security**, **privacy**, and **individualism**.

Security within the apartment, in the building and in the neighborhood would add a lot to the living quality in most cities. It could be obtained with a design that creates small, controlled spaces and well-lit and unobstructed entrances and hallways. But, even more important than a security-oriented design is that the inhabitants are sensitive to aberrations and react with care, assistance or alarm. A social control can be established when the inhabitants feel a responsibility not only for their apartments, but for their neighbors and their surrounding as well. In a transient neighborhood, it is more difficult to get to know the neighbors and their habits. The dwelling units and the common facilities should be designed for long term occupancy, satisfying the different and changing needs of its inhabitants.

Privacy within the apartment and in private outdoor spaces, especially in dense, socially controlled neighborhoods is a major demand of today. The apartment should provide space where each occupant can be in complete privacy. The amount of disturbing noises, views, and odors that would influence the retreat should be controllable by the inhabitant of the dwelling unit.

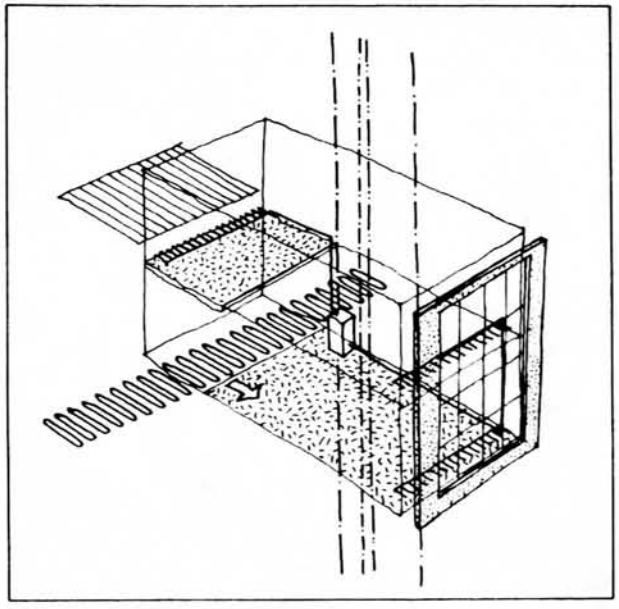
Individualism is first priority in our society. People are living different lifestyles on different schedules. There is a wide variety of different leisure activities. In our growing population with more and more mass communication, mass transportation, mass tourism and mass consumption, there is a need for room where one can express and distinguish oneself from the masses. The apartment house has a basic framework that allows each occupant to create his own individual home. The facades should express the individuality of the single units, especially the ones facing public spaces.

Part Two: The Development of the Dwelling Unit the "Convertible"

In the next step I am trying to develop the smallest city unit: the dwelling unit. The major guidelines are constant. A simple volume should allow to have a prominent and memorable street facade, the back or garden side and the roof should provide a wide variety of outdoor activities. The interior with its possibilities of alterations should reflect the situation of our society of today: different life styles and a continuously changing use can be satisfied. Different variations of the facades, of the section and of the access to the dwelling unit will make it possible, to fit the unit in very different sites.

Idea

A double-story high space spans from the street side to the garden side of the apartment house. The entrance to this space is from a single-loaded corridor on the garden side. Basic installations (electricity, gas, heating, water and sewage) and at least one gallery above the entrance are given; other than that, the apartment can be completed or altered by the occupants with simple means, according to their individual design.



Investigations

First, I assumed the approximate dimensions for the standard double-story space. It should accommodate a spacious apartment with one bedroom as well as a more compact one with three to four bedrooms. The size of the apartments will range between 900 and 1,400 square feet, therefore the dimensions of the given volume should be about 45 by 16 by 16 feet. Smaller or larger apartments can either be achieved by varying the standard volume, or by locating them within the part of the building that contains the vertical access elements.

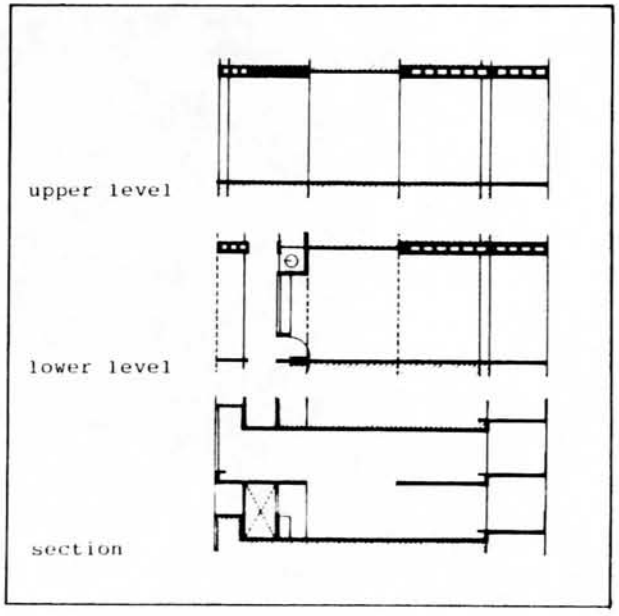
The main investigations focus on the interior and its geometry. In several studies, I try to figure out the most convenient locations for shafts and the furnace, the optimum amount of given galleries, partitions, and services, and possible locations for the stairs.

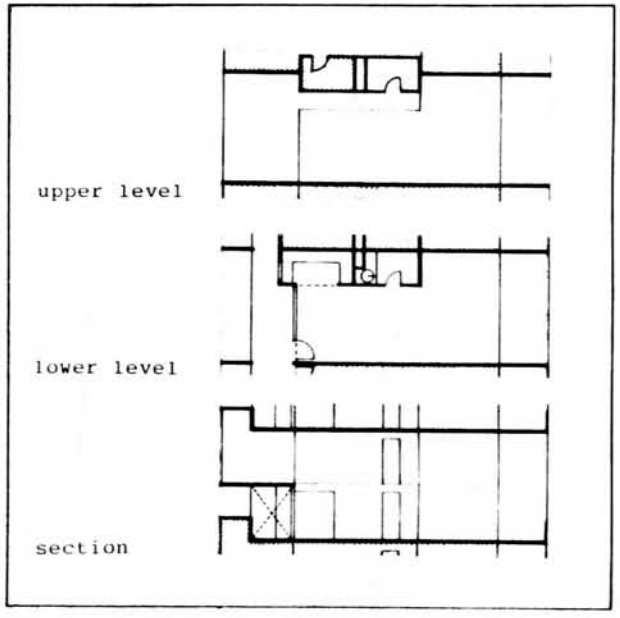
The neighborhoods and the sites will vary for each dwelling unit, therefore different reactions concerning scale, materials, and functions should be possible. Furthermore the standard unit should be adjustable to different locations within the section. Several investigations concentrate on these issues.

The final part deals with different possibilities for the vertical access, depending on the given site conditions and the chosen section.

The first variation works with two given galleries. Possible alterations can be made with the bathrooms, the stairs, additional floor area between the galleries and partitions.
The square footage for kitchen, bathrooms and circulation is too big, thereby filling the interior double-story space and a major quality gets lost.

The second variation combines the kitchens and the bathrooms from two apartments into one core in order to clear as much volume as possible. As the services are interlocked in plan and in section, problems with noise transmission and structure would result. The entrance and the bathroom open directly onto the living room.

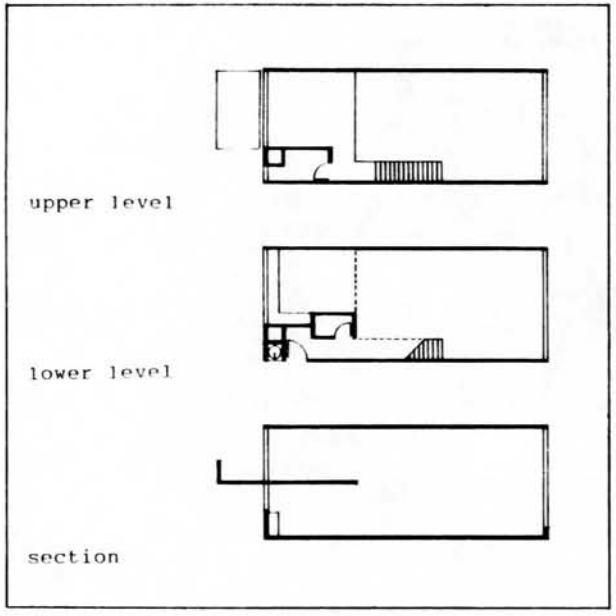


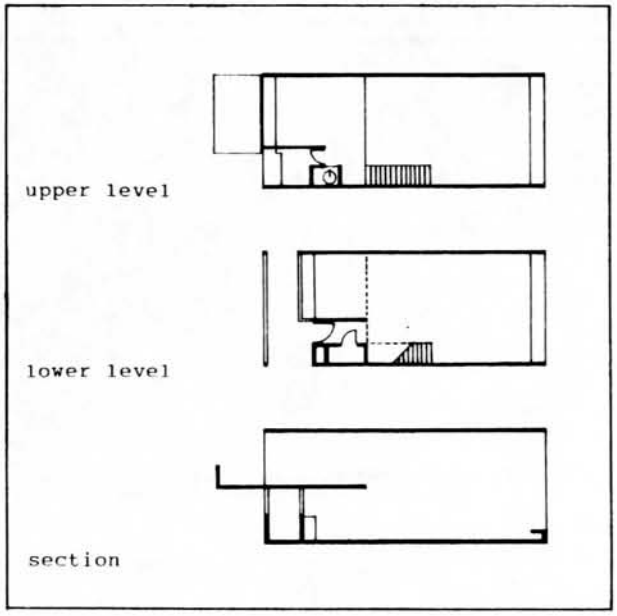


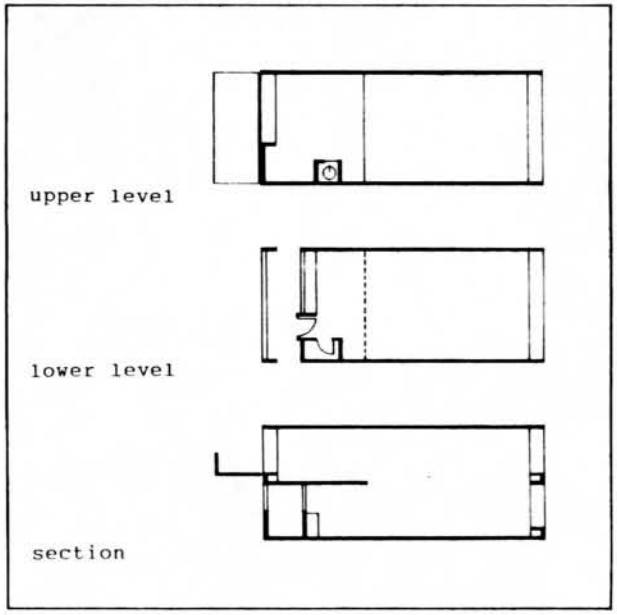
The third variation hides the entrance and the downstairs bathroom underneath the gallery and the stairs. The upstairs bathroom is naturally lit and ventilated. The unit is designed to sit at the end of a hallway, therefore it cannot be repeated.

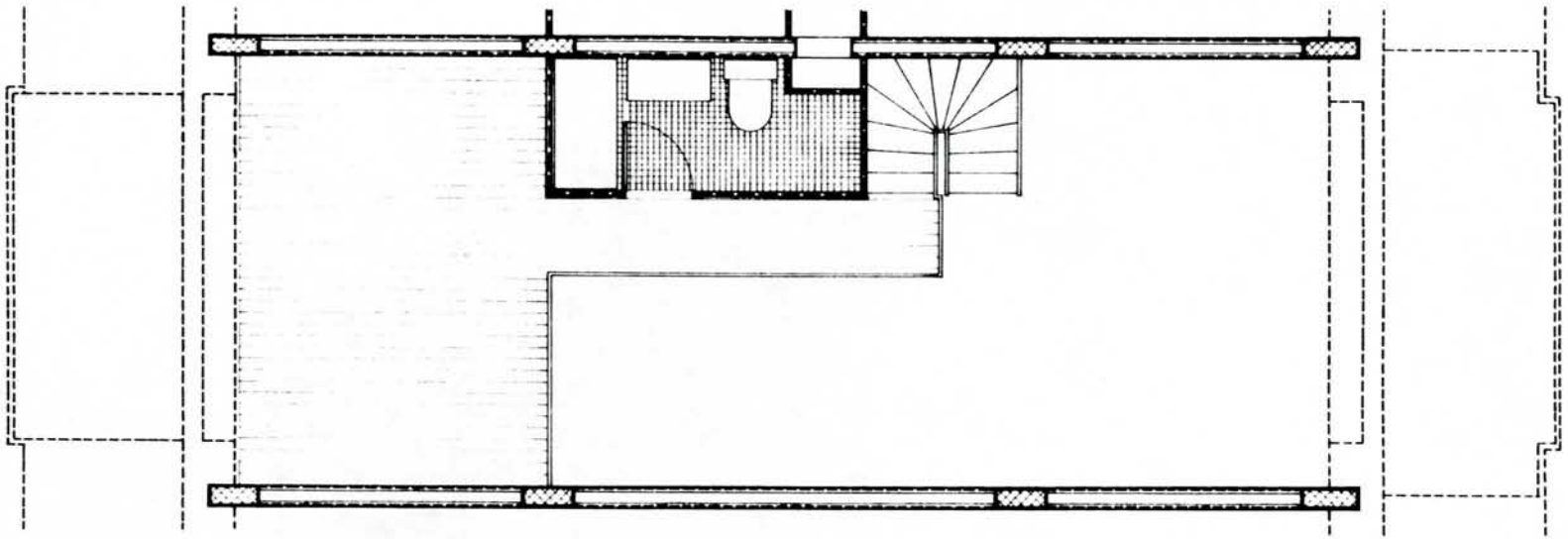
The fourth version is a variation of the previous one. The main difference is the continuous hallway in front of the kitchen and the position of the shaft for the mechanical system beside the partition between the units.

The fifth variation uses a minimum amount of given partitions. The type and the location of the stair is determined by the occupant. The half bathroom underneath the gallery is enclosed, the gallery floor upstairs has no given partitions between the bedroom and the bathroom area. It can be arranged according to individual design. In the last three variations the given gallery cannot be subdivided into two small bedrooms. This limits the possibilities for an individual use of the space drastically.

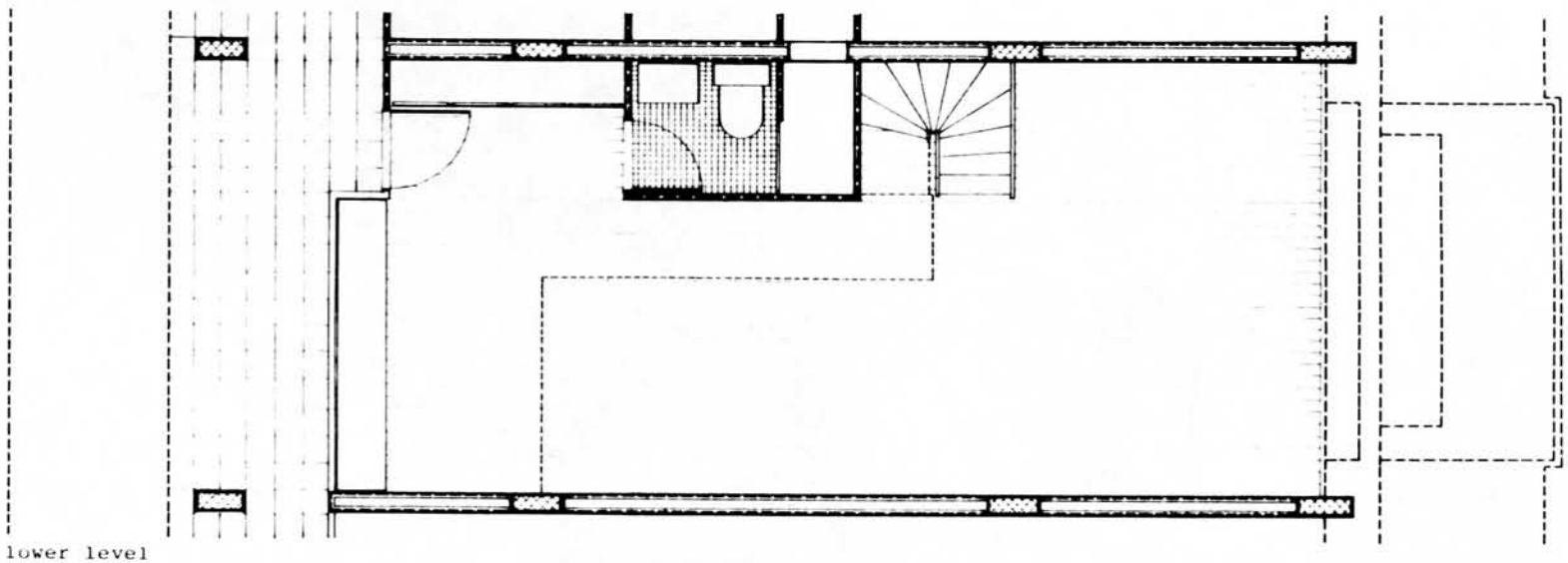








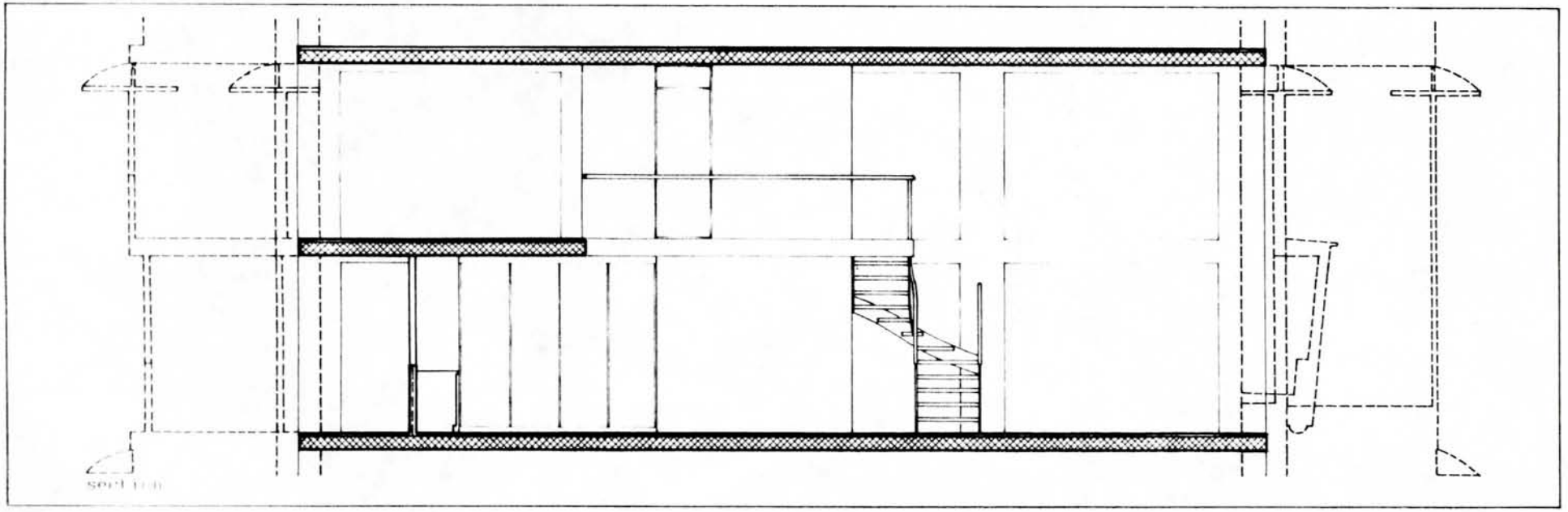
upper level



lower level

The Standard Type

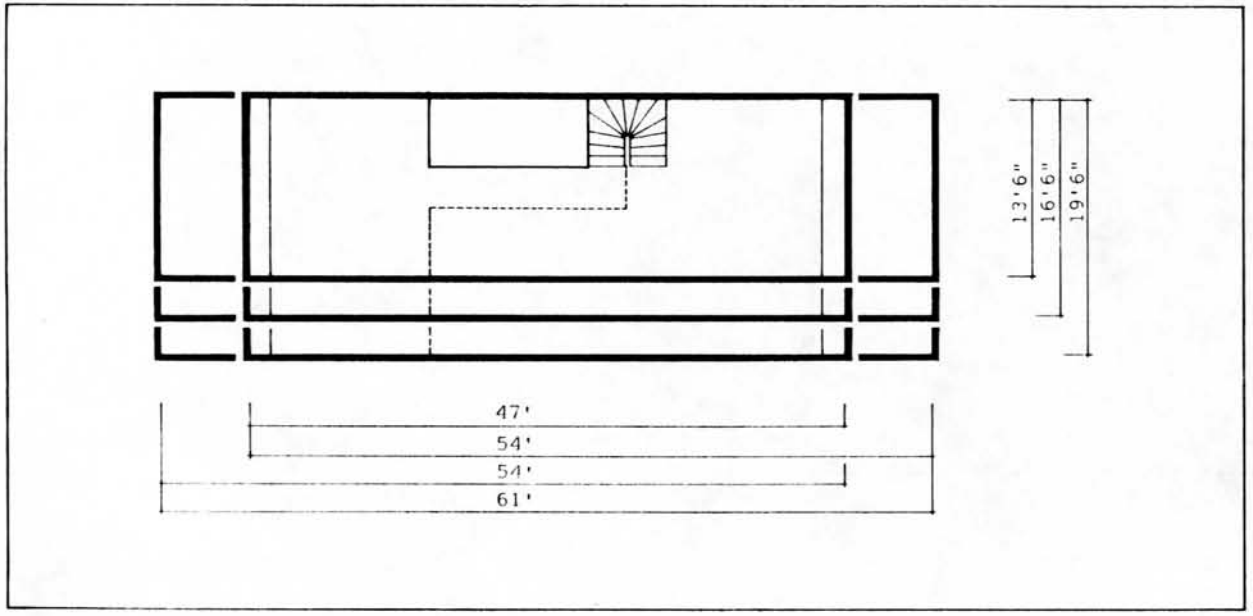
The final variation again works with interior bathrooms, therefore allowing the given gallery above the corridor to be subdivided. The entrance door and the shaft for the mechanical system are on the same side so that there can be an entrance with possible access to the downstairs bathroom. The partitions, the gallery walk way and the stairs are all alterable.

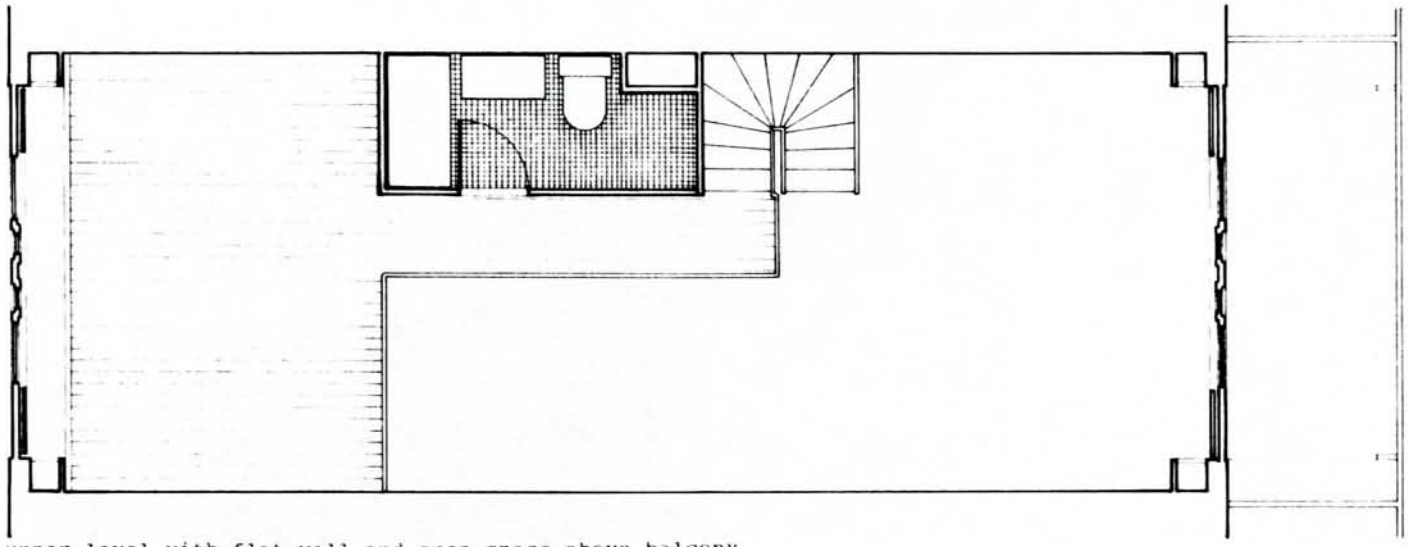


Alterations in Size

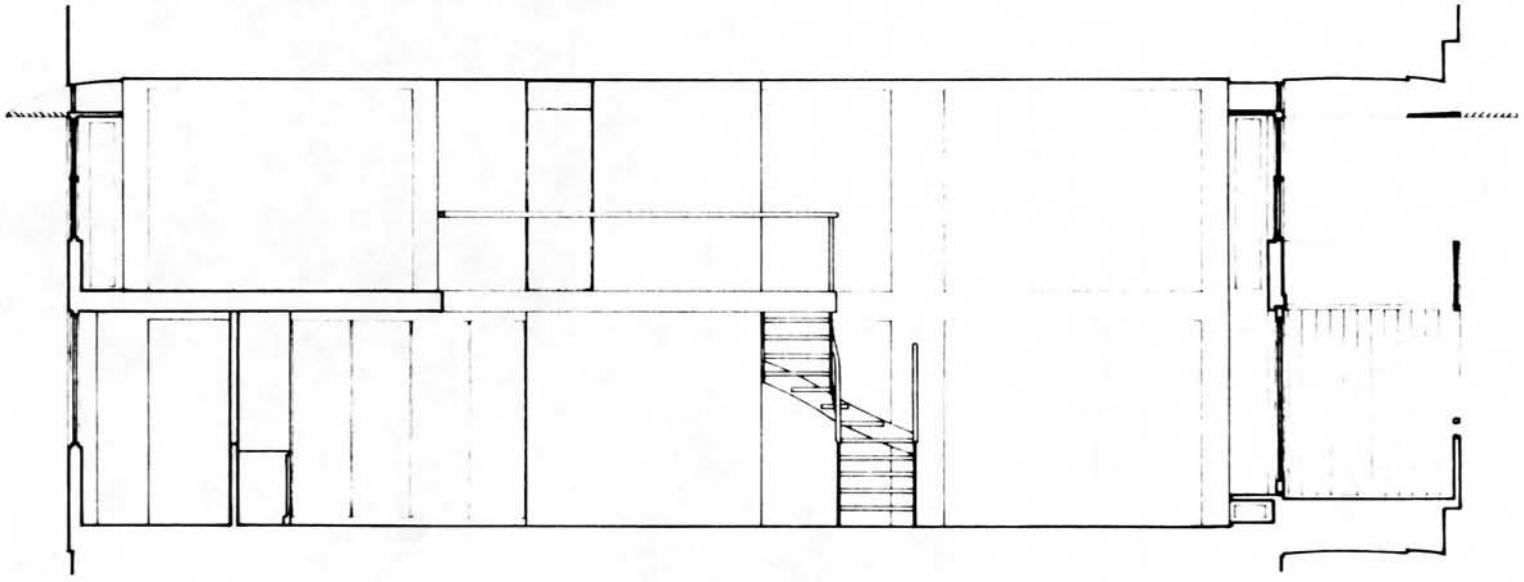
To make the apartment adjustable to different sites and context conditions, its length, its width and the transition zone between the inside and the outside can be varied.

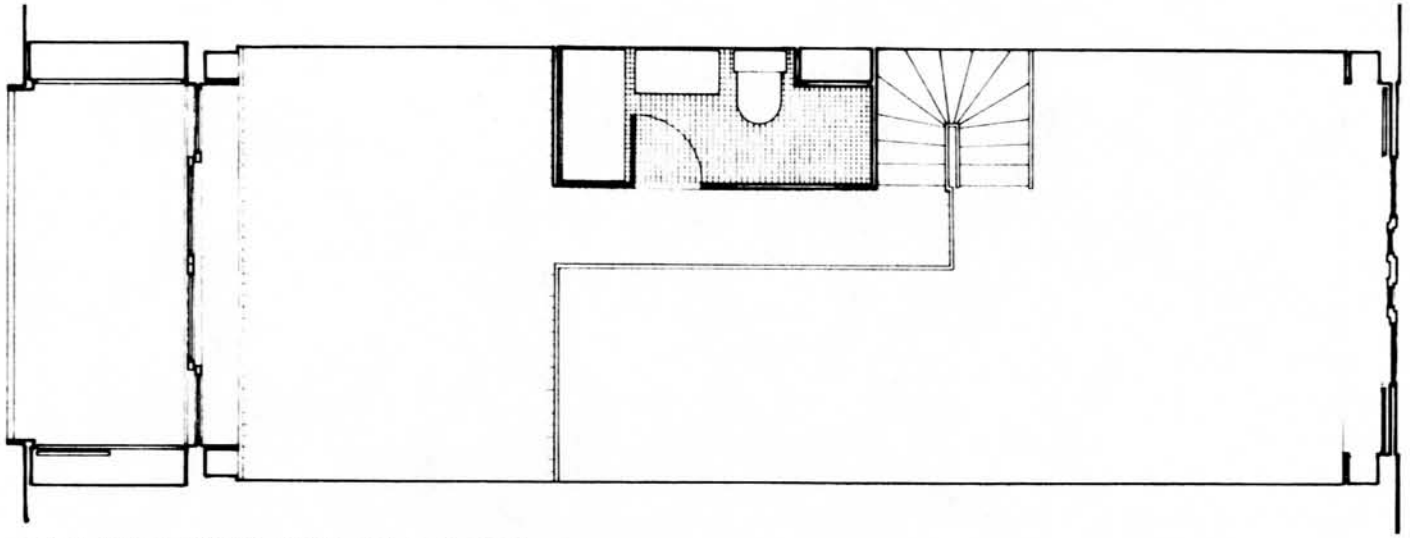
On the next four pages, different transition zones are shown in plan and section.



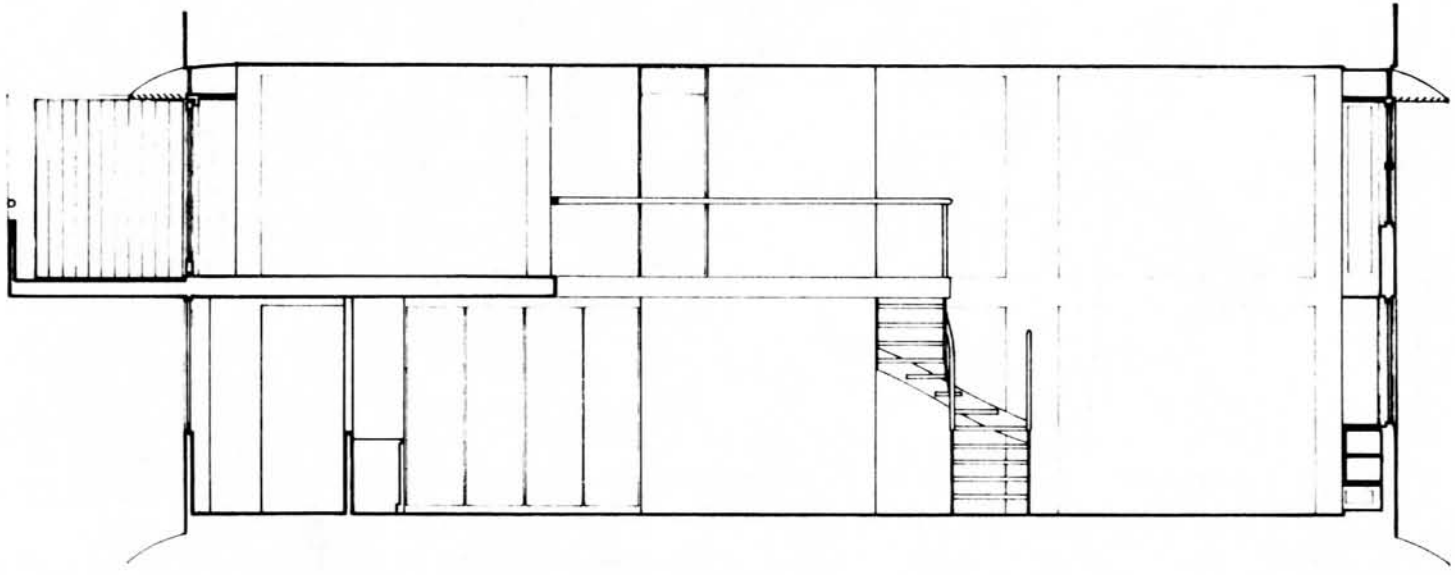


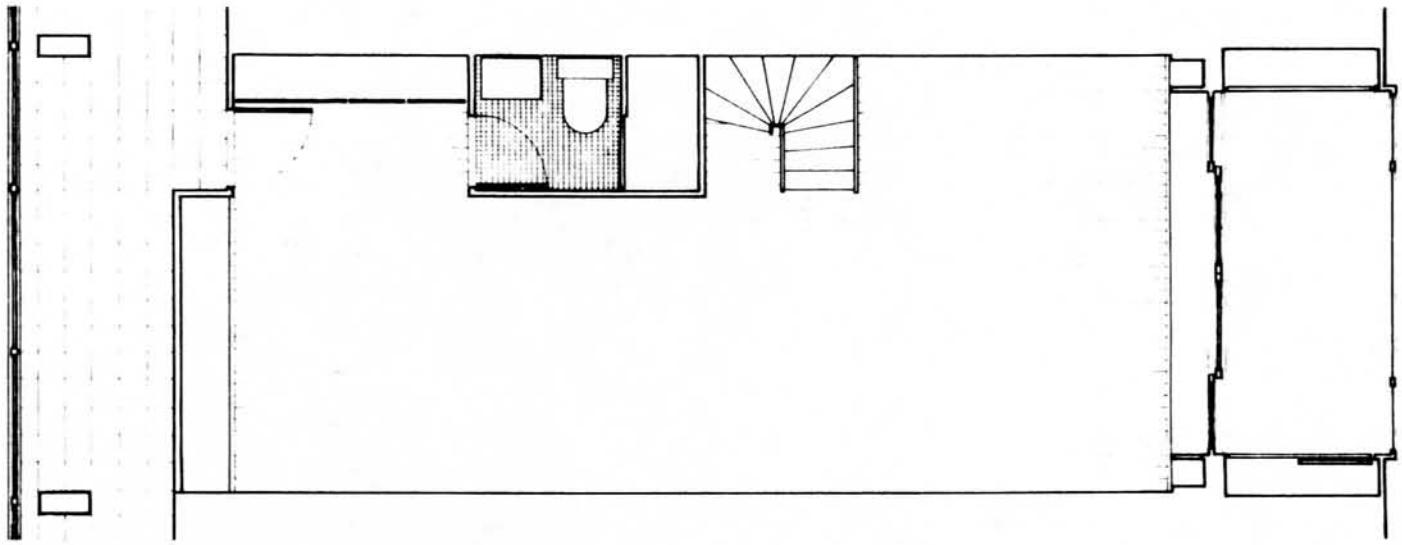
upper level with flat wall and open space above balcony



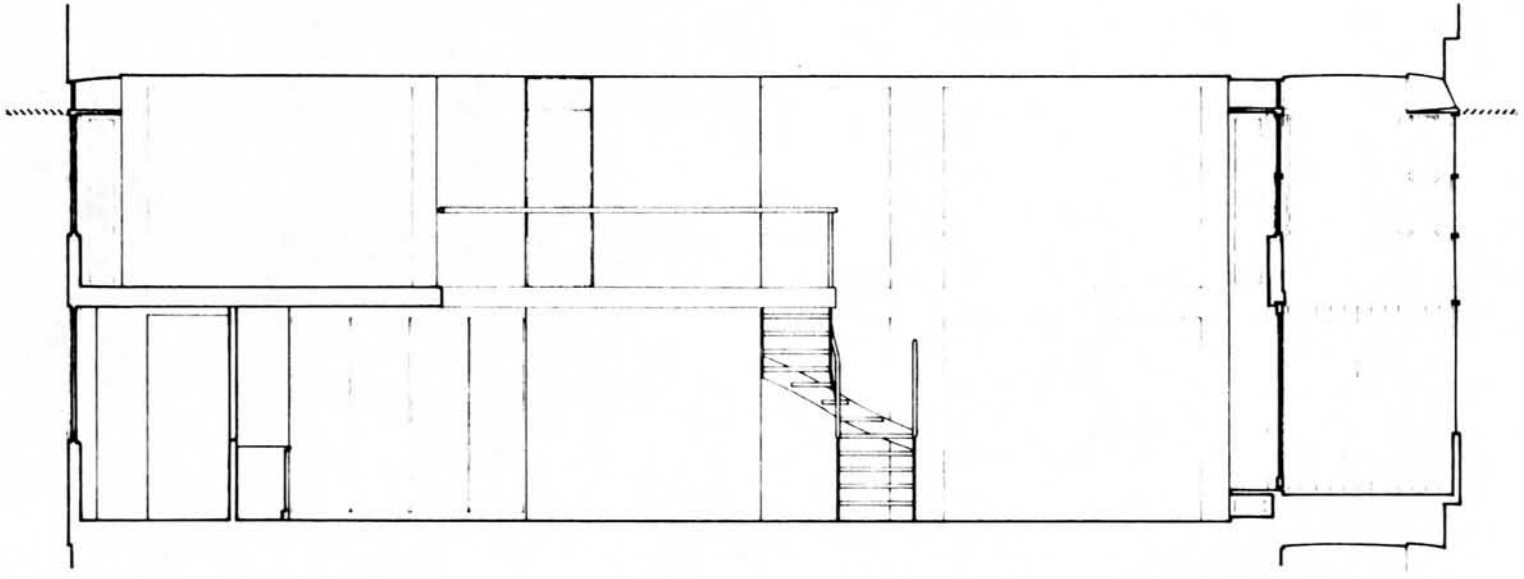


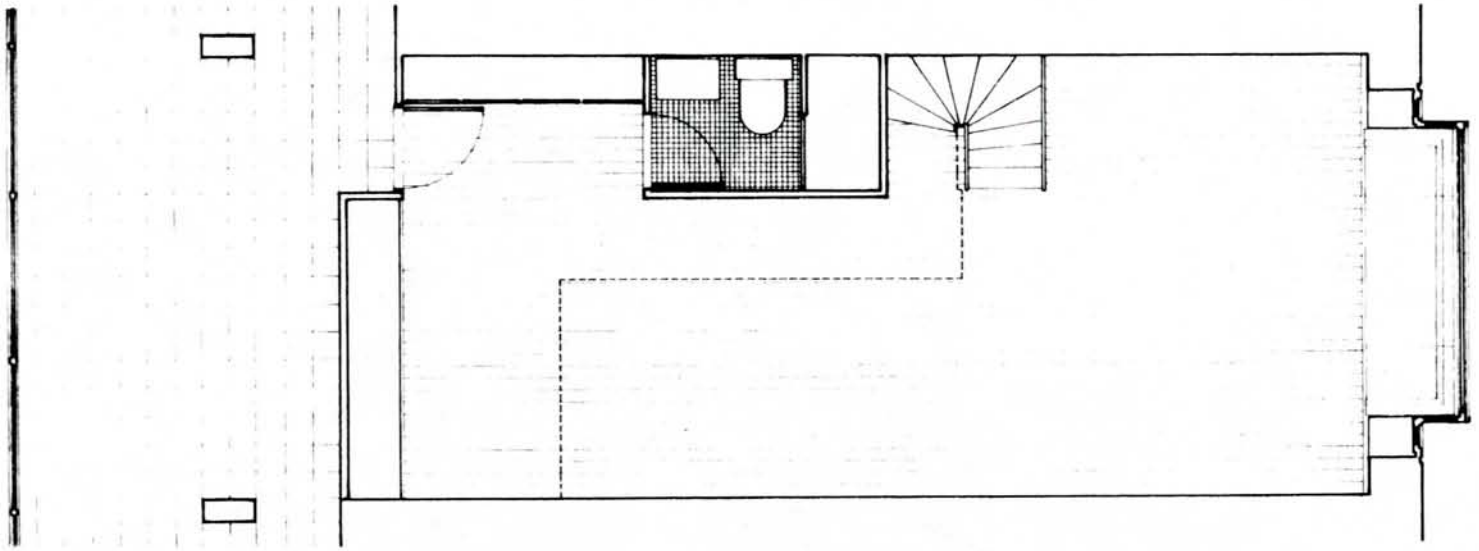
upper level with balcony and flat wall



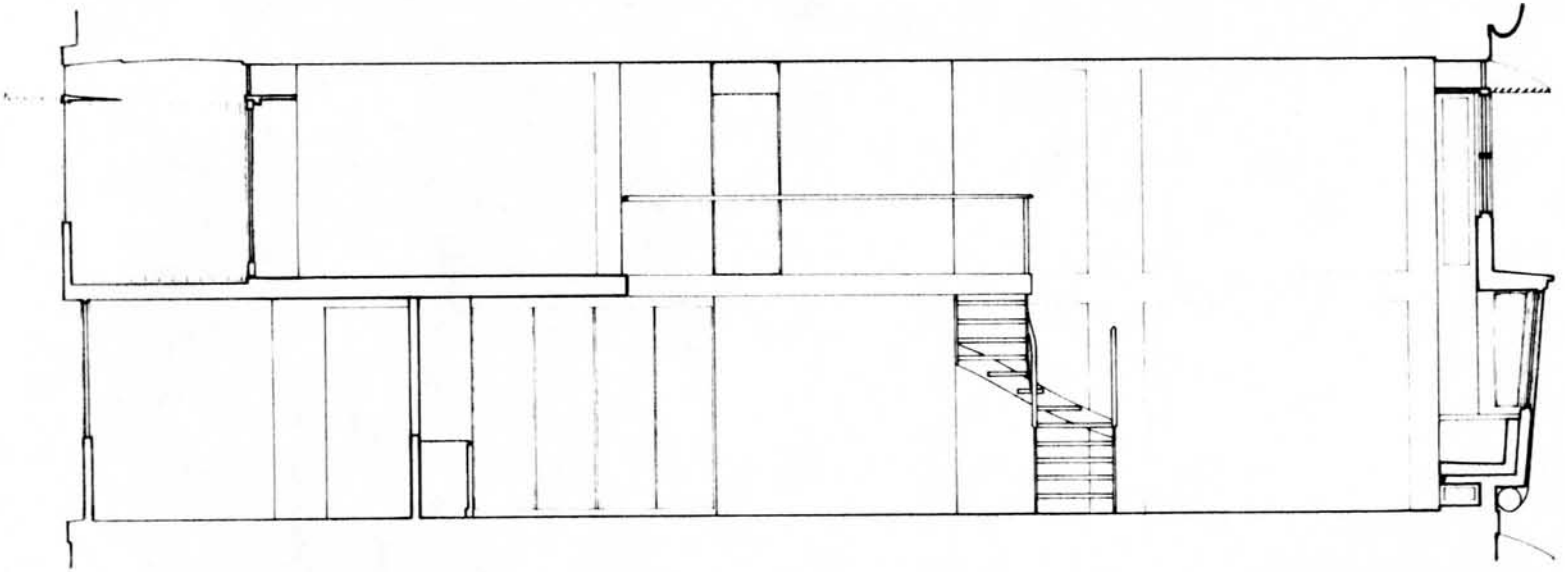


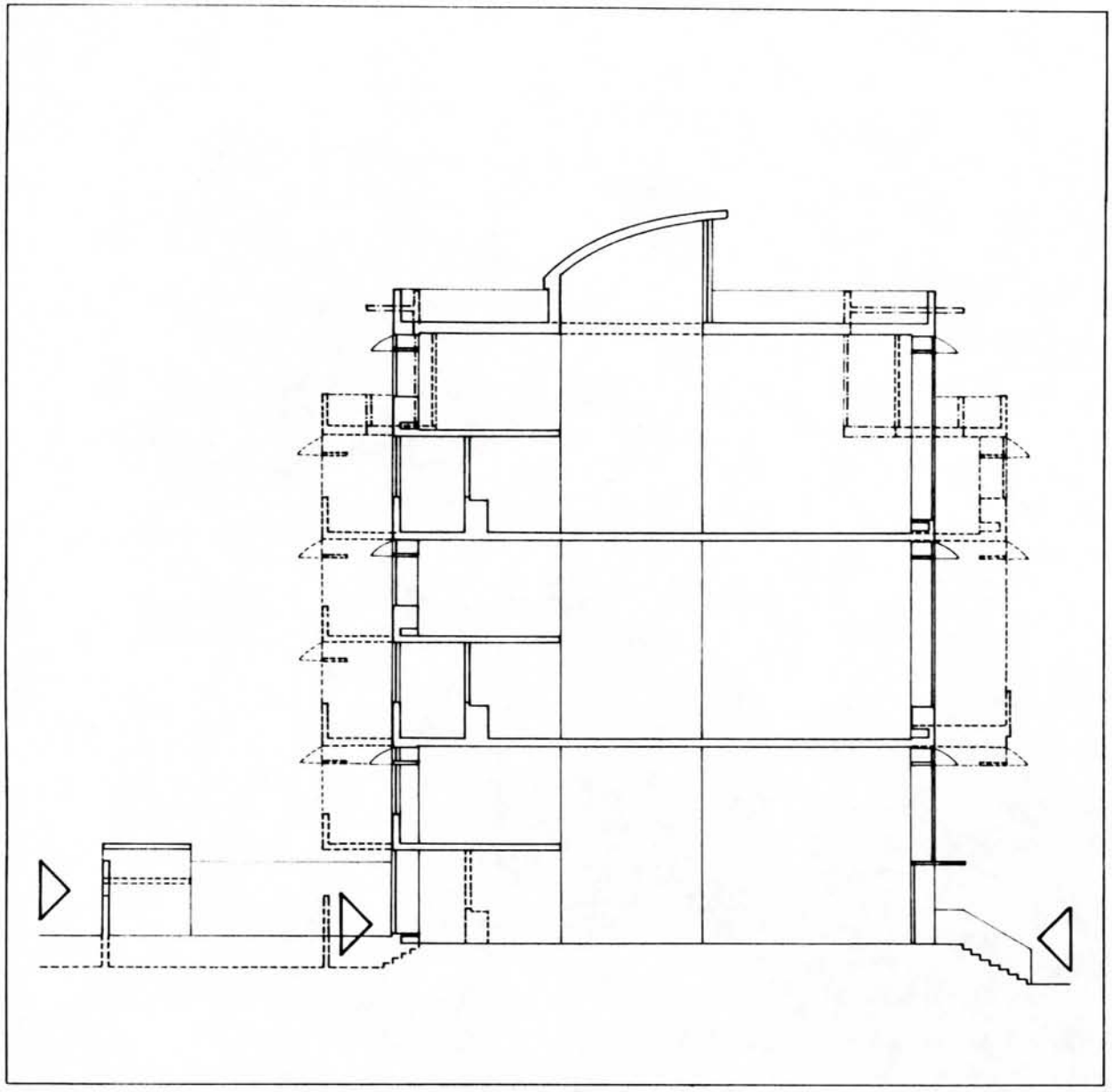
lower level with narrow corridor and greenhouse





lower level with wide corridor and bay window

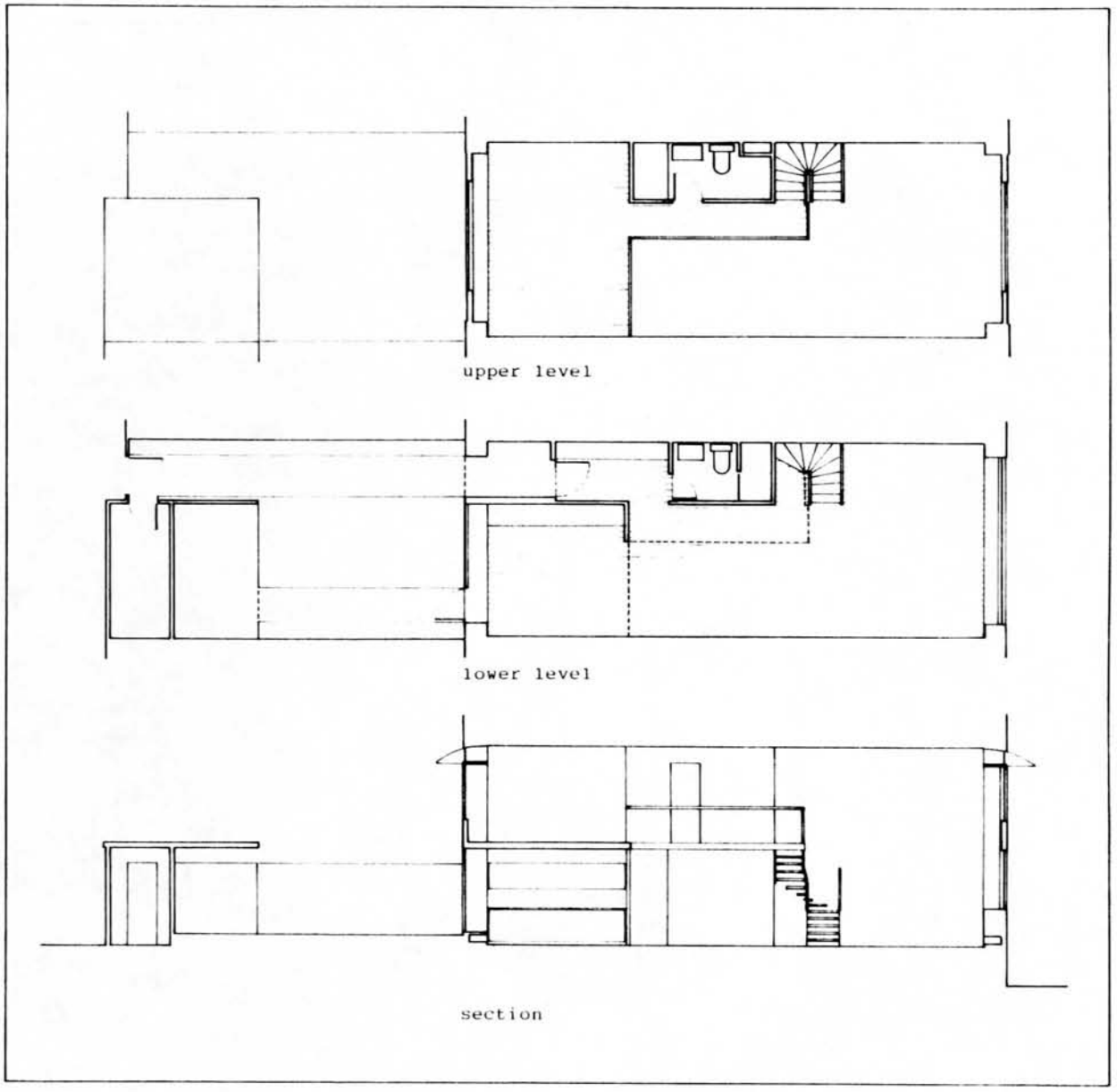




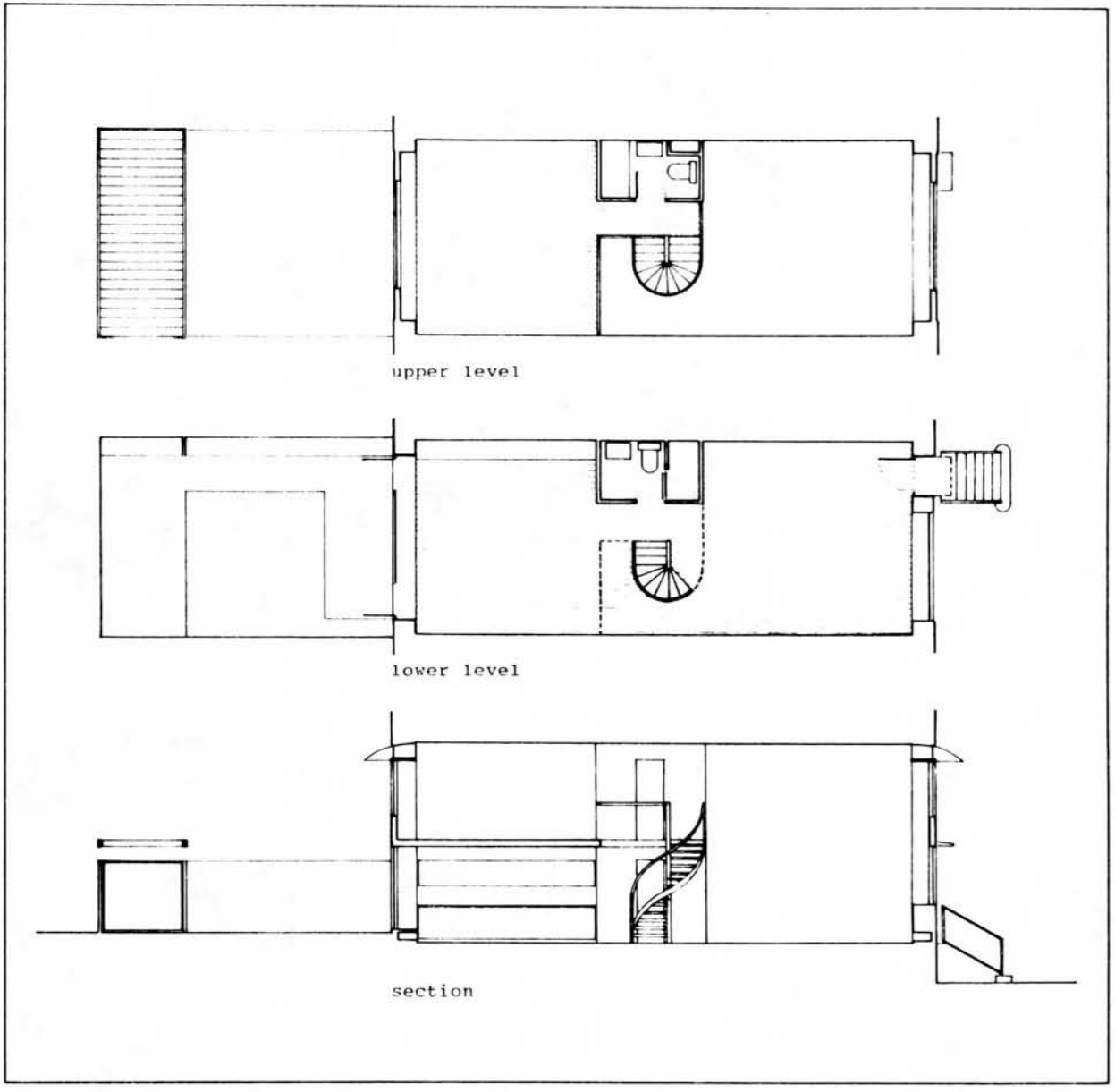
Alterations in Section

Depending on the neighborhood, the site conditions and the location within the section, the standard apartment may have to be transformed. Private access through the backyard or directly from the street will change the "convertible" on the ground floor. Whether the roof is private or public has an influence on the top apartment. On the following pages are four different reactions shown.

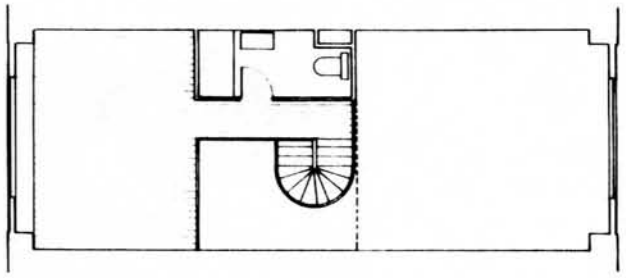
With private access through a small garden in the backyard, there is no need for an access corridor anymore; the kitchen moves to the outside wall and gets a direct exit.



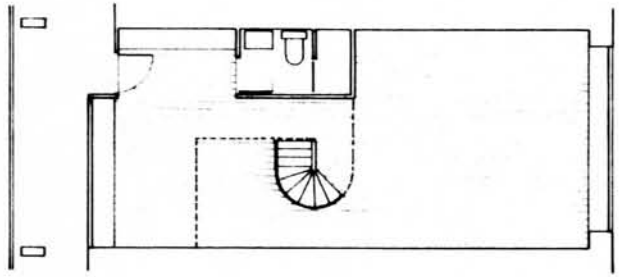
When the ground floor apartment is accessed directly from the street, the corridor in the back disappears, and instead, there could be a small garden in front of the kitchen and the dining area. The stair will go in the middle zone, so that the entrance and the living room (or a bedroom have enough space next to each other on the street side.



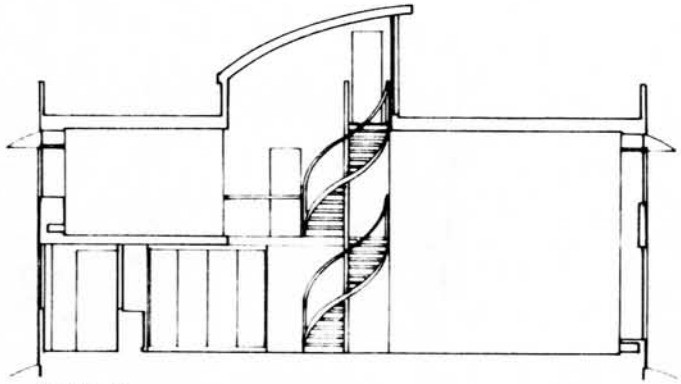
An obvious solution in order to have access to a private roof terrace is to lift the roof above the middle zone. The variability of the outside zones is kept, and the middle zone gets a third light source because of the additional window on the roof level.



upper level

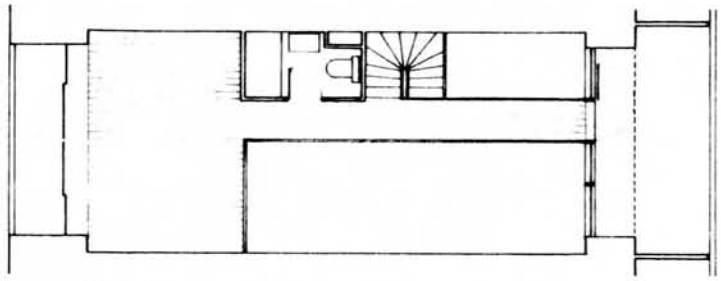


lower level

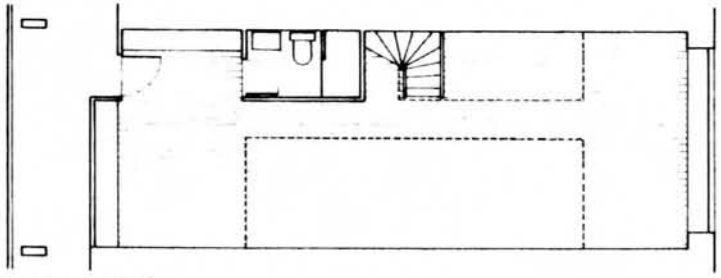


section

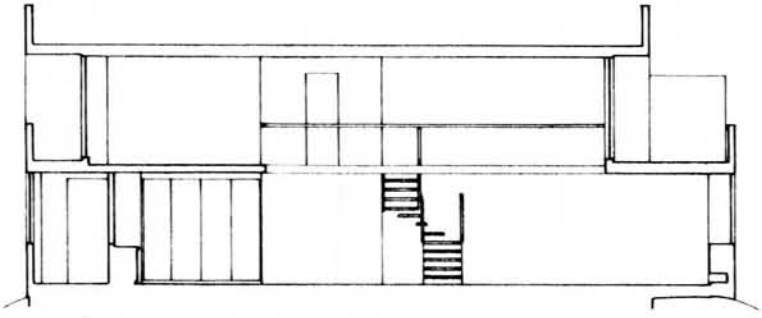
To articulate the top apartment, the lower level can be enlarged into the street side balcony zone. A terrace on the upper level can substitute for the lost balcony below and makes it possible to step back the building. The roof terrace would be public.



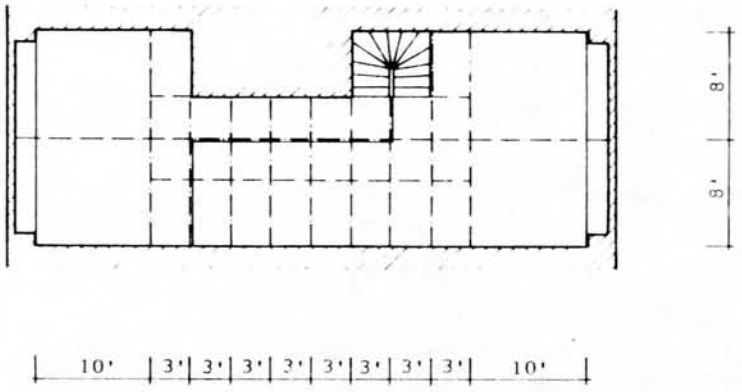
upper level



lower level

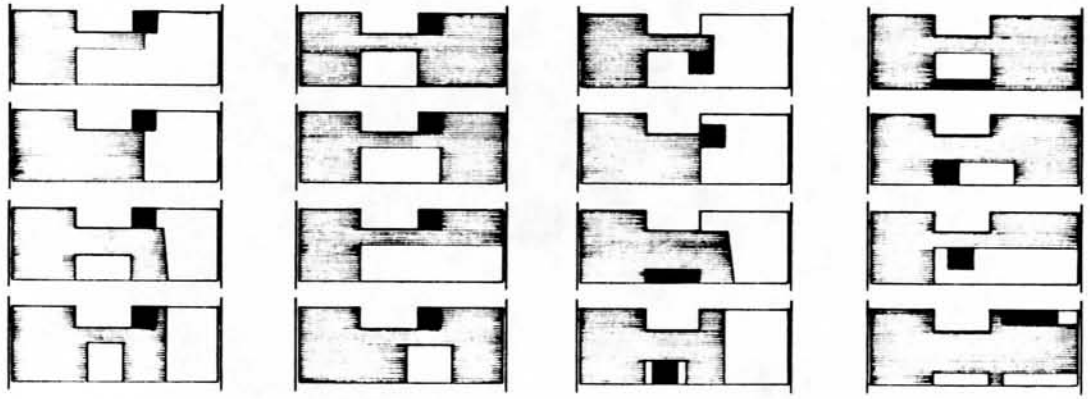


section



Geometry

The geometry of the plan is based on the smallest possible room (8 by 10 feet). Four of them could occupy the corners. Eight stripes of three feet intervals are placed between the four small fields. In the middle along one side there is enough room to easily fit in a winder staircase and a small bathroom.



Variations

Based on the geometry from above, the figure at the right shows some possible upstairs floor patterns. The first two columns work with the given bathroom and the given stair. In the next two columns, the stairs are moved too. Many more variations could be made by also varying the bathroom core.

Examples of Individual Unit Designs

Following I will show a few design studies for one basic dwelling unit type. It has a double-story balcony towards the street and a flat wall towards the back.

The first one, for two people, contains a big double-story living room with a sleeping gallery and a luxurious bathroom.

The second one, for two people, has a large, enclosed bedroom and a small working gallery.

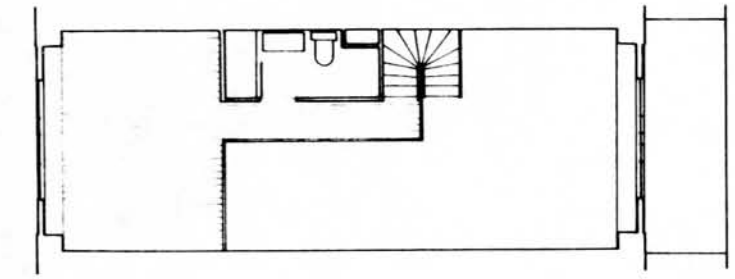
The third one, for two people, offers a huge working and sleeping gallery, a dining room next to the exterior corridor, and an interior kitchen.

The fourth one, for a small family, contains living area downstairs and bedrooms upstairs.

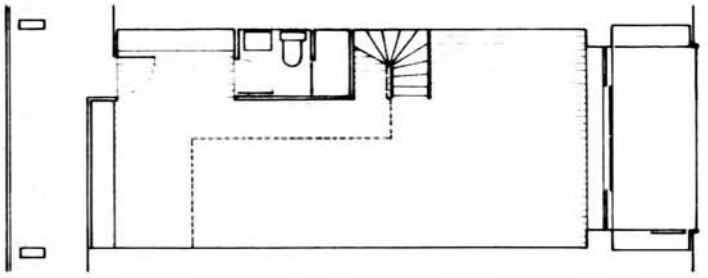
The fifth one, for a small family, has a big living room downstairs, a small master bedroom, a play area, and children bedrooms upstairs.

The sixth one, for a small family, has on the lower level children bedrooms, a play area, and the dining room. A master bedroom and a living gallery are upstairs.

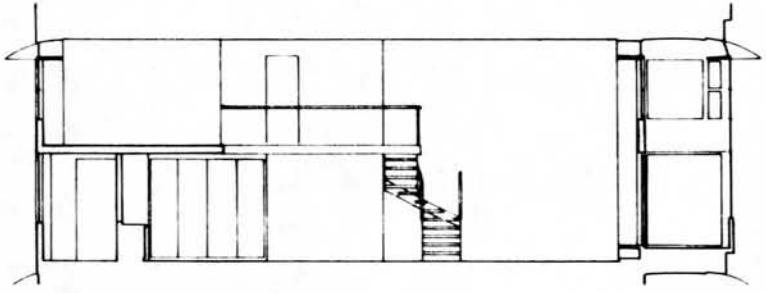
The seventh one, for four students, has dining and living area downstairs. Four bedrooms and two bathrooms are located upstairs.



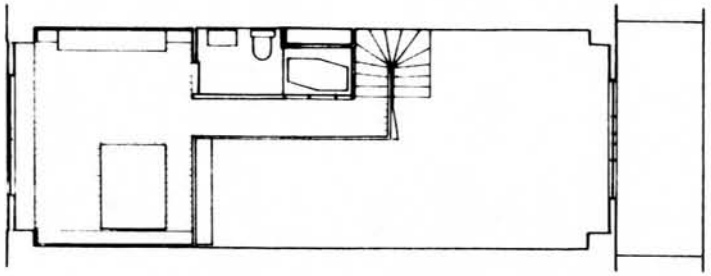
upper level



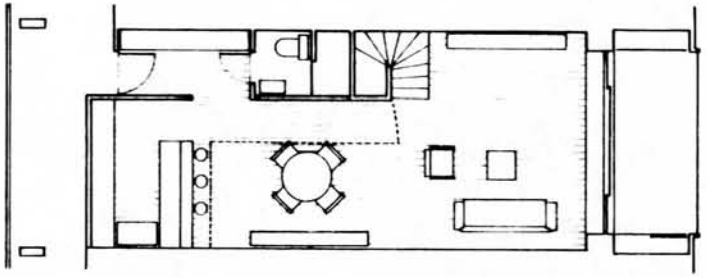
lower level



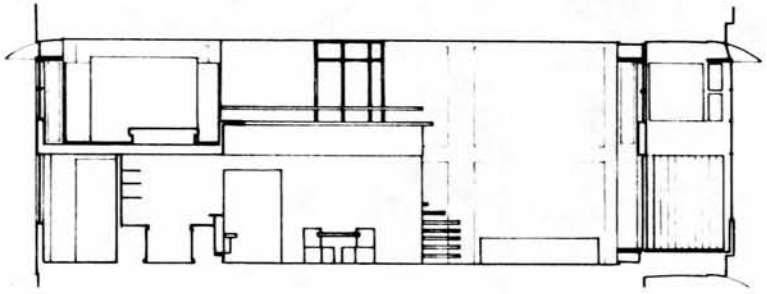
section



upper level



lower level



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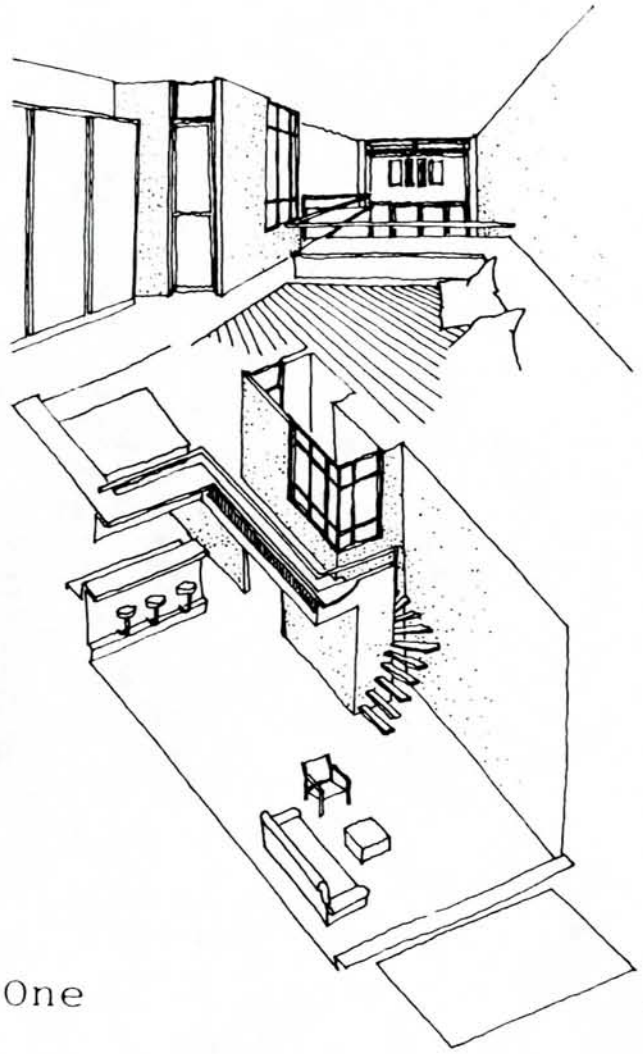
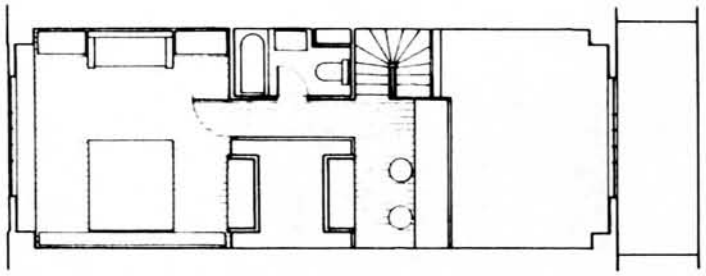
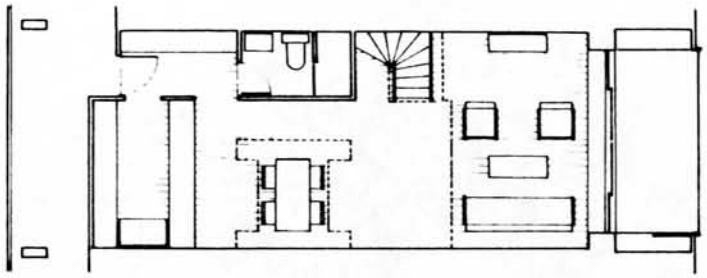


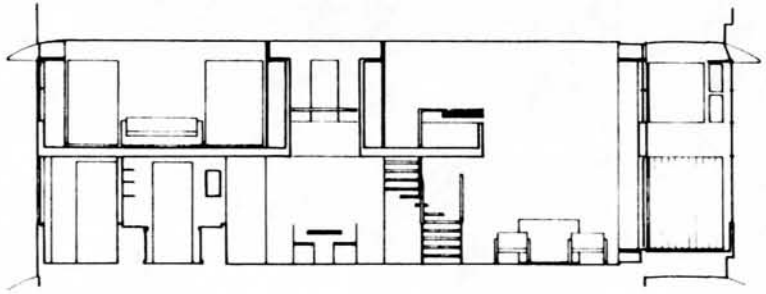
One



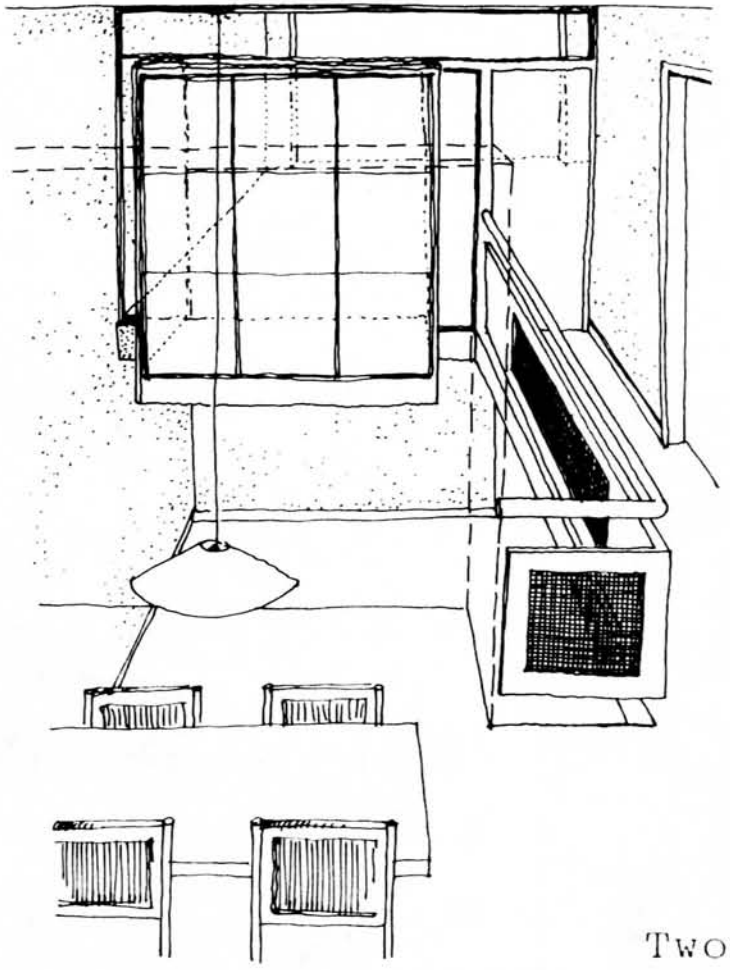
upper level



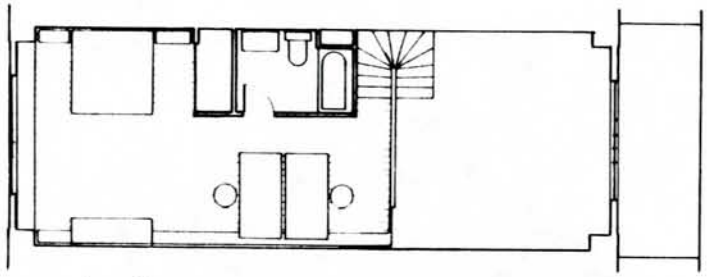
lower level



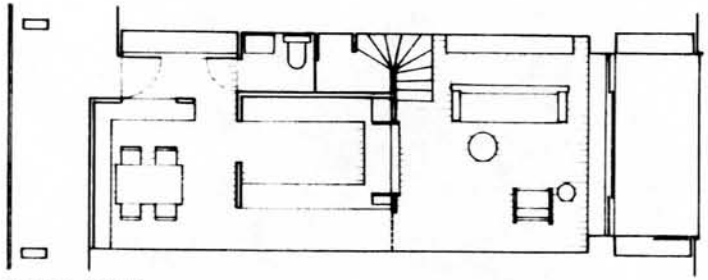
section



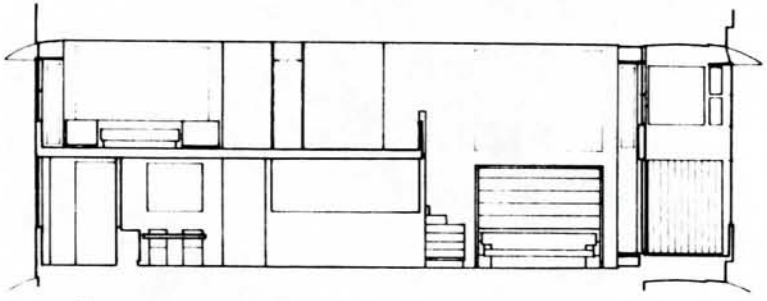
TWO



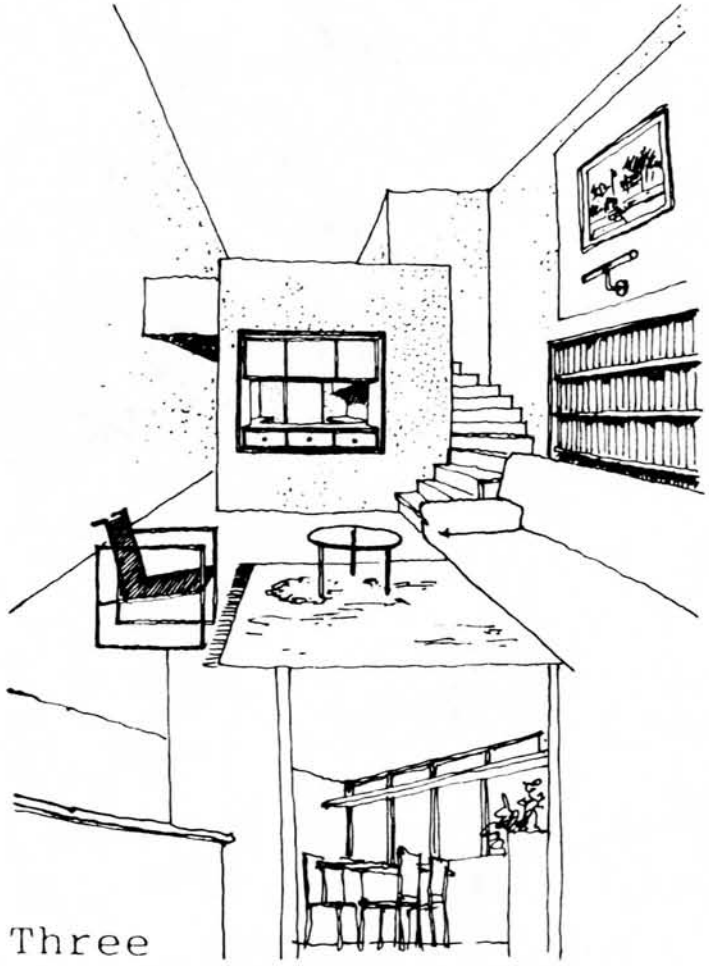
upper level



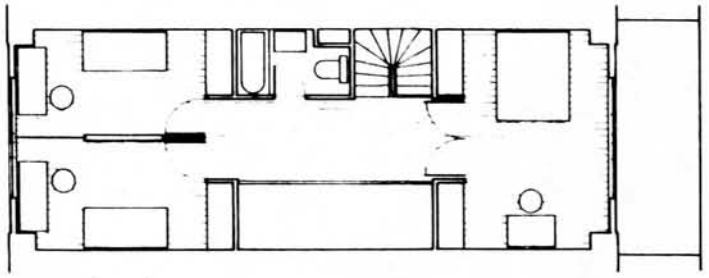
lower level



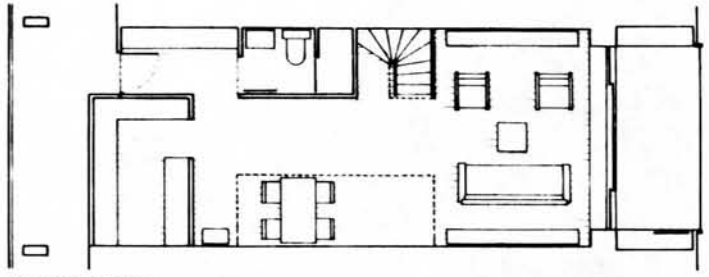
section



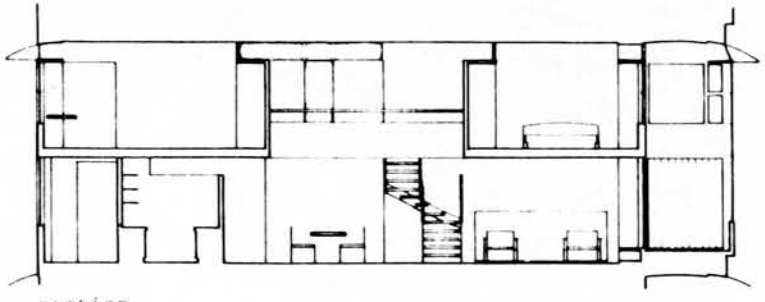
Three



upper level



lower level



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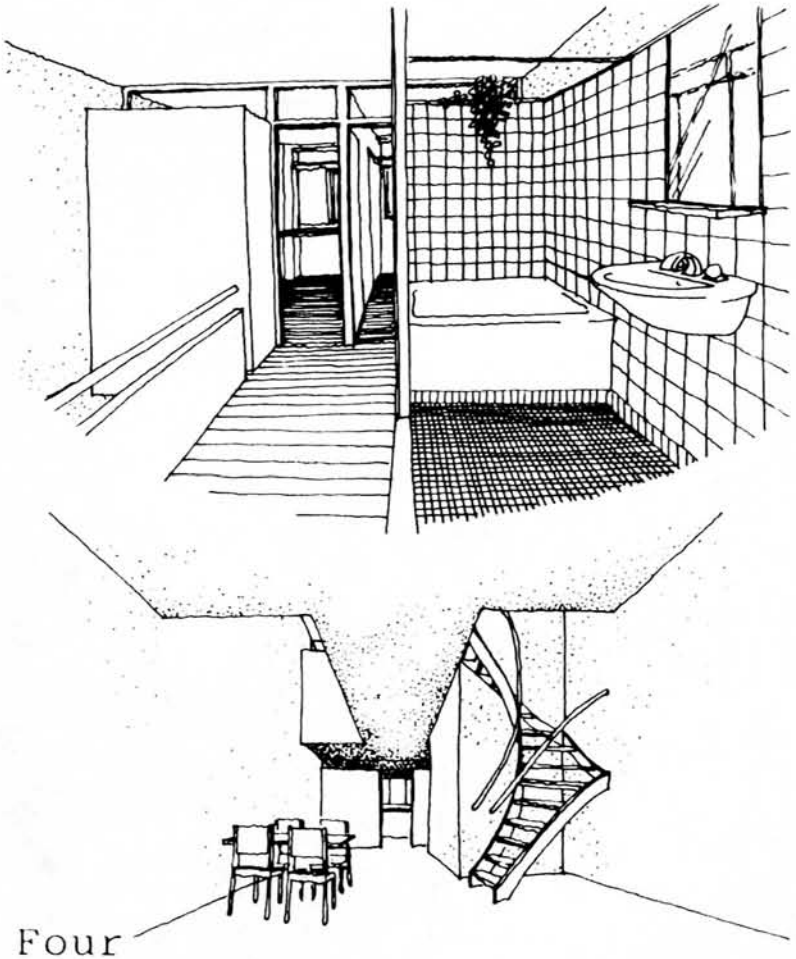
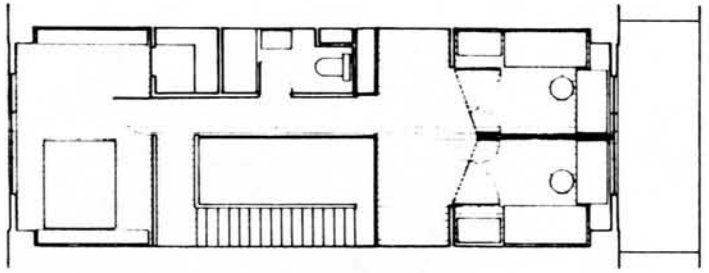
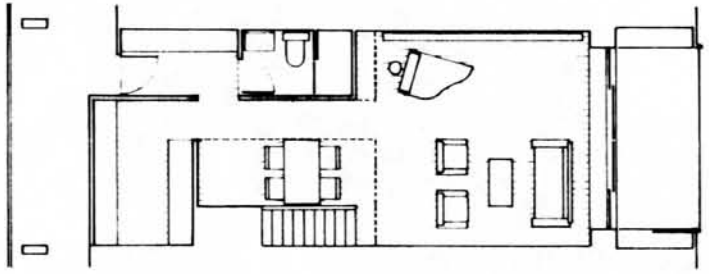


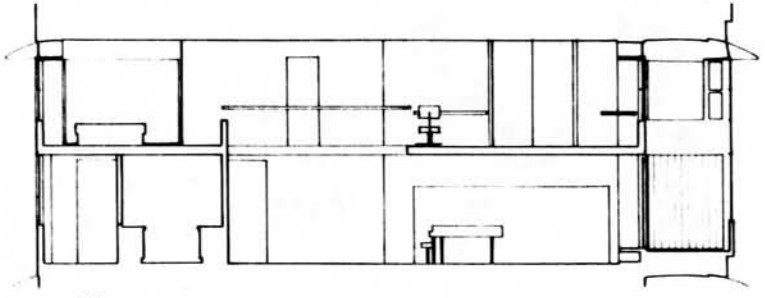
Four



upper level



lower level



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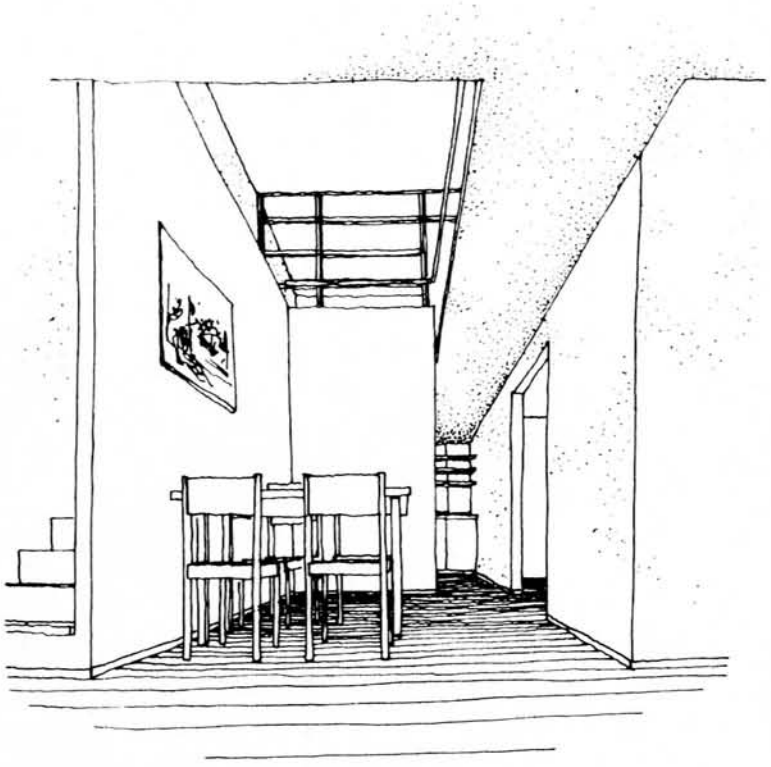
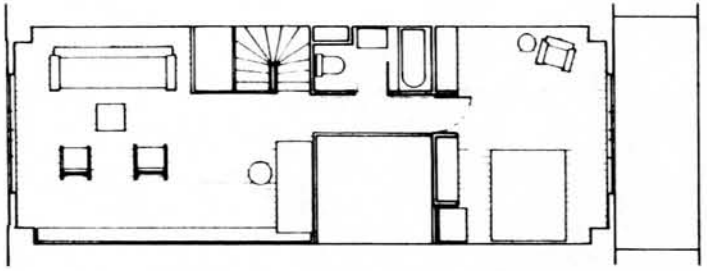
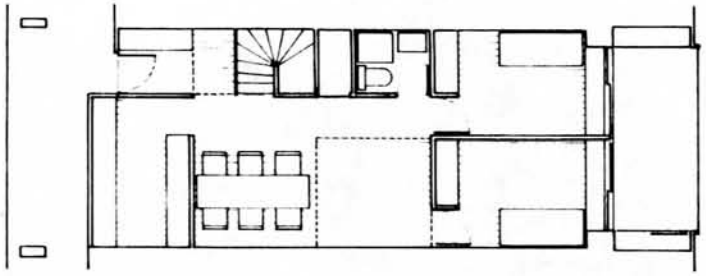


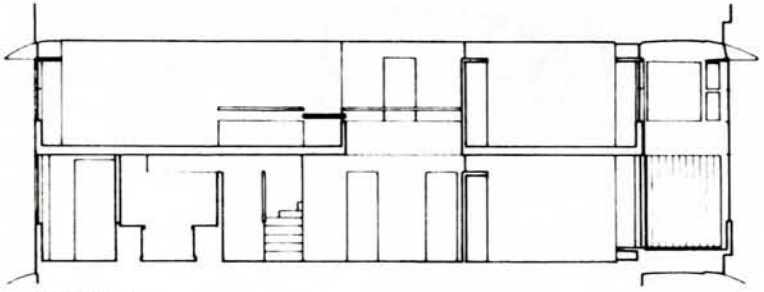
Five



upper level



lower level



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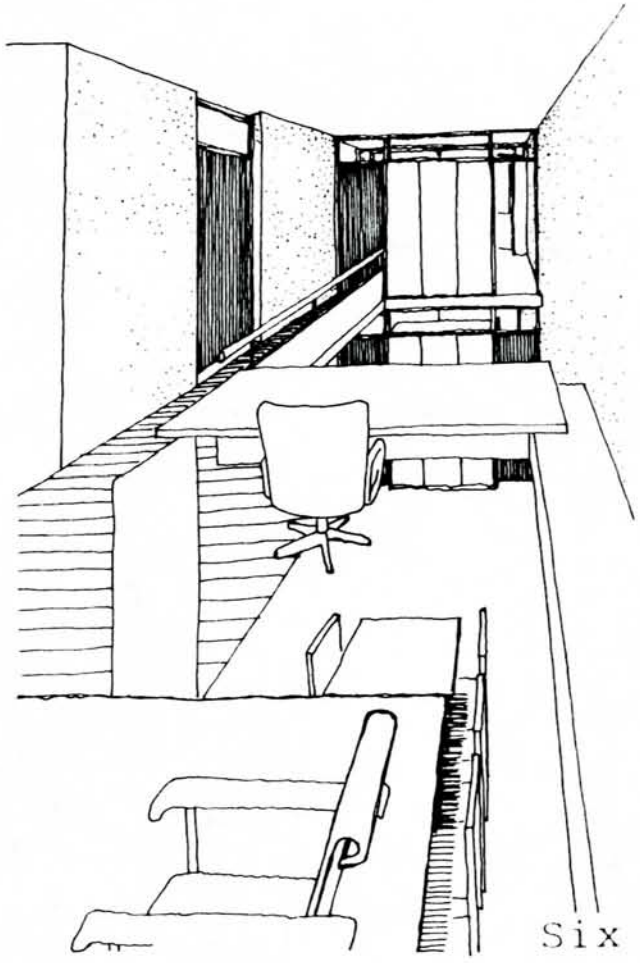
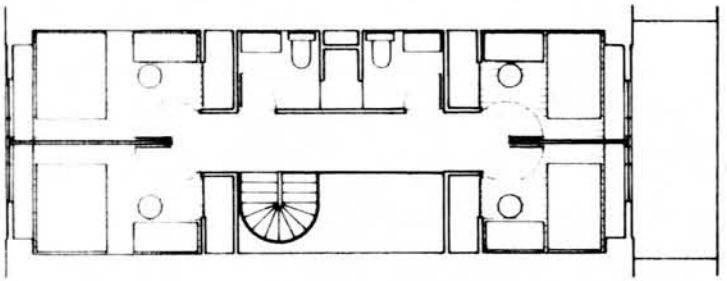
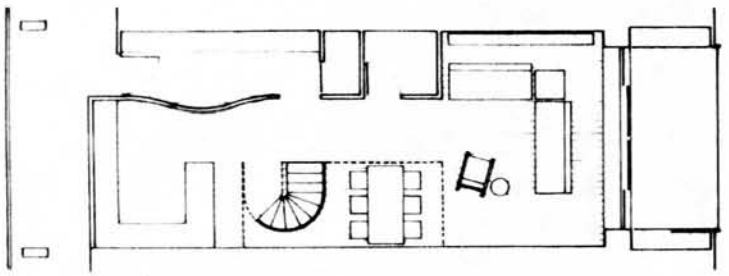


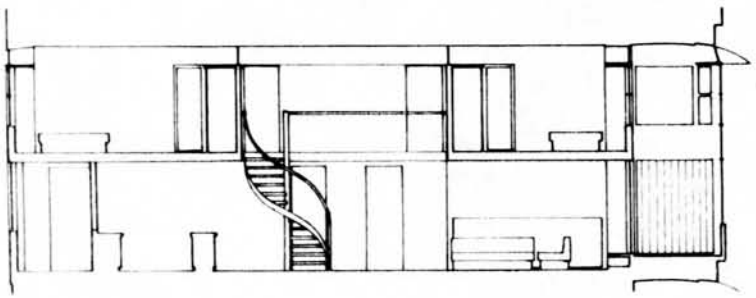
Six



upper level



lower level



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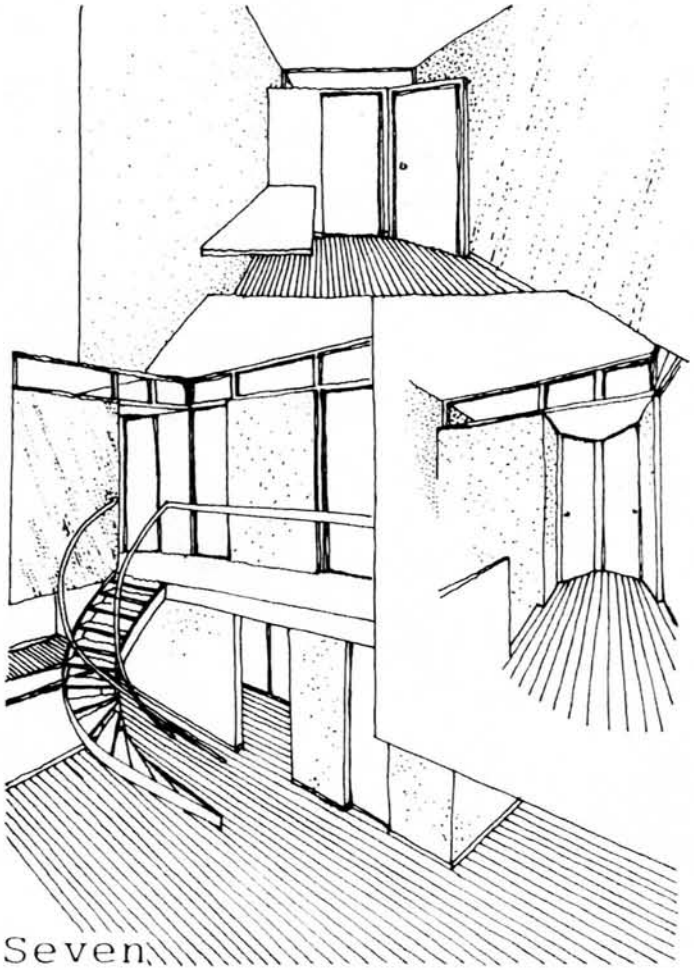

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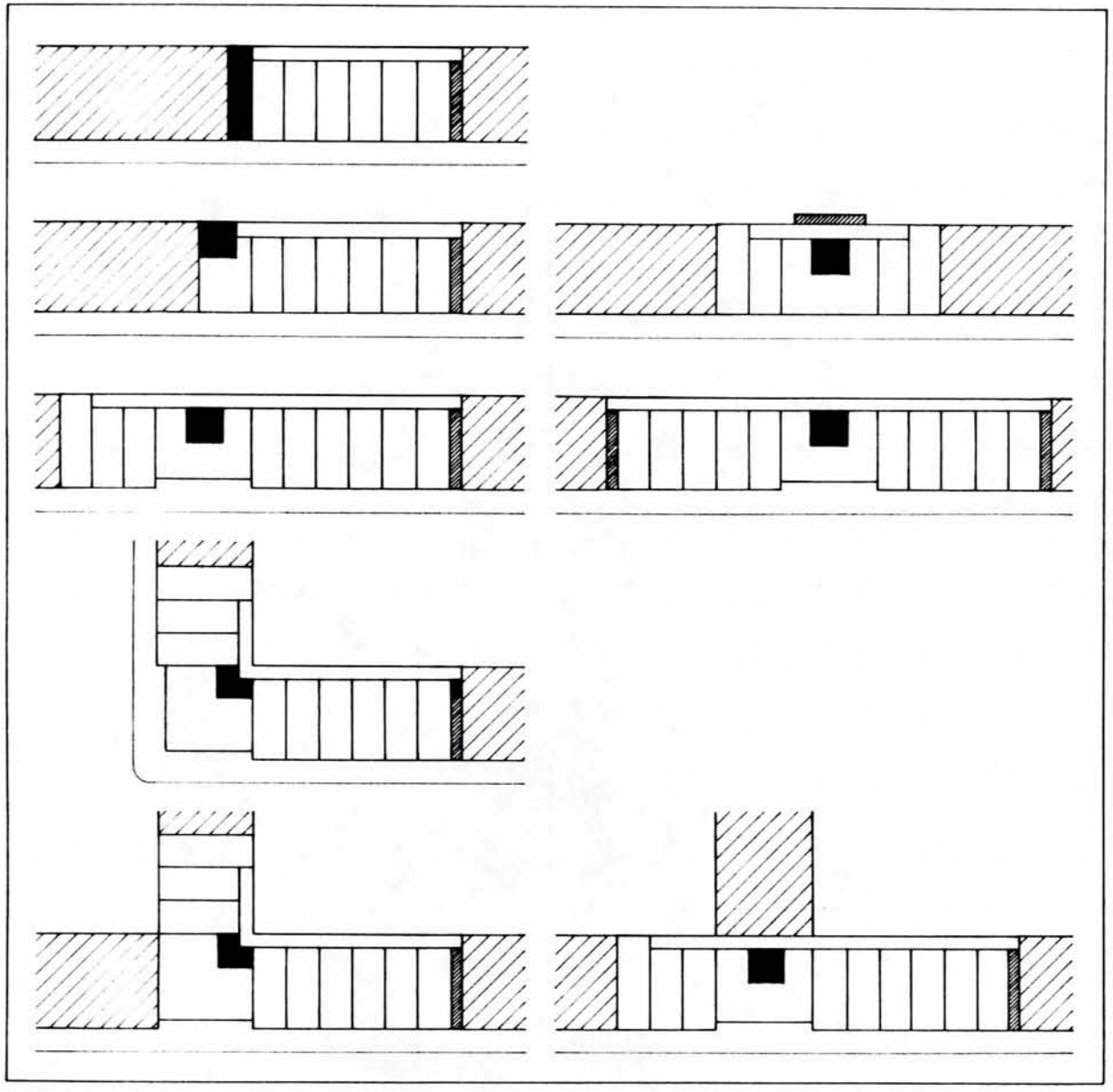


Vertical Access Elements

Even though all "convertible" buildings require exterior single-loaded corridors, the expression of the building, to a far extend, will depend upon the chosen type of vertical access. The standard dwelling unit type can be used in four-story, walk-up or eight-story, elevator projects, arranged in asymmetrical or symmetrical bars and in linear, L-shaped or T-shaped buildings.

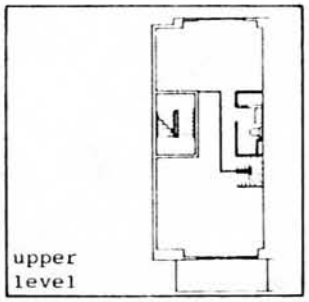
Main stairs and elevator cannot fit within a variation of the standard unit type "convertible". Freestanding vertical access elements would create undesirable interruptions within the continuous space defining planes. To fill these gaps, small flats and common facilities such as laundry, crafts shop, children's playroom, bicycle and baby-carriage storage, mailboxes and trash room can be added to the vertical access elements. Together, they will form a special part of the apartment house, marking the entrance or allowing an individual solution in a corner site.

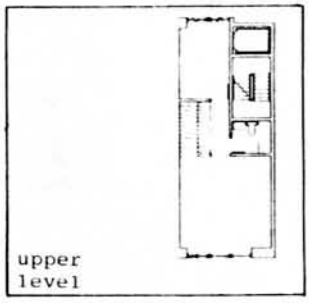
On the following pages are a few arrangements of vertical access elements shown.

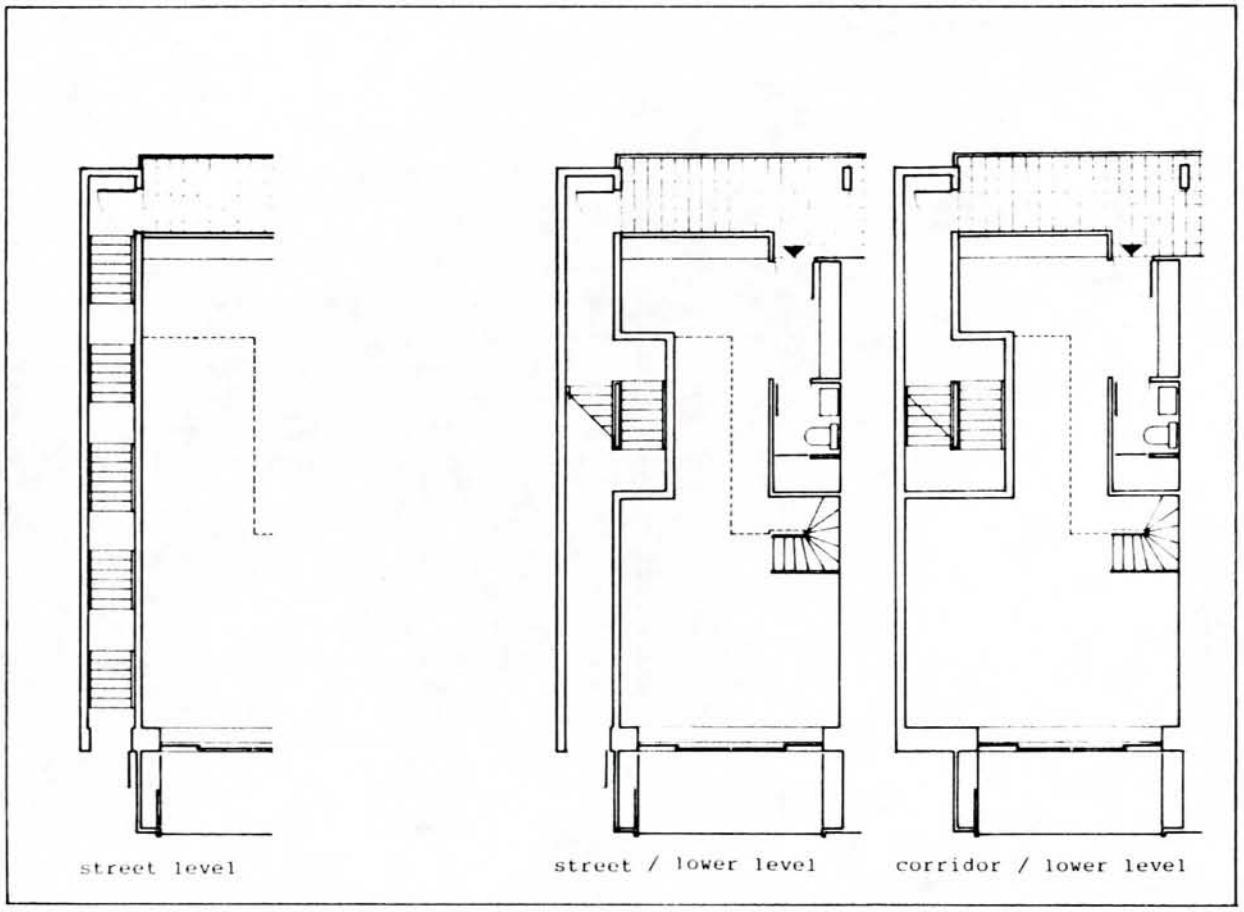
Firestairs at the end of the corridor for
a walk-up building of less then four floors

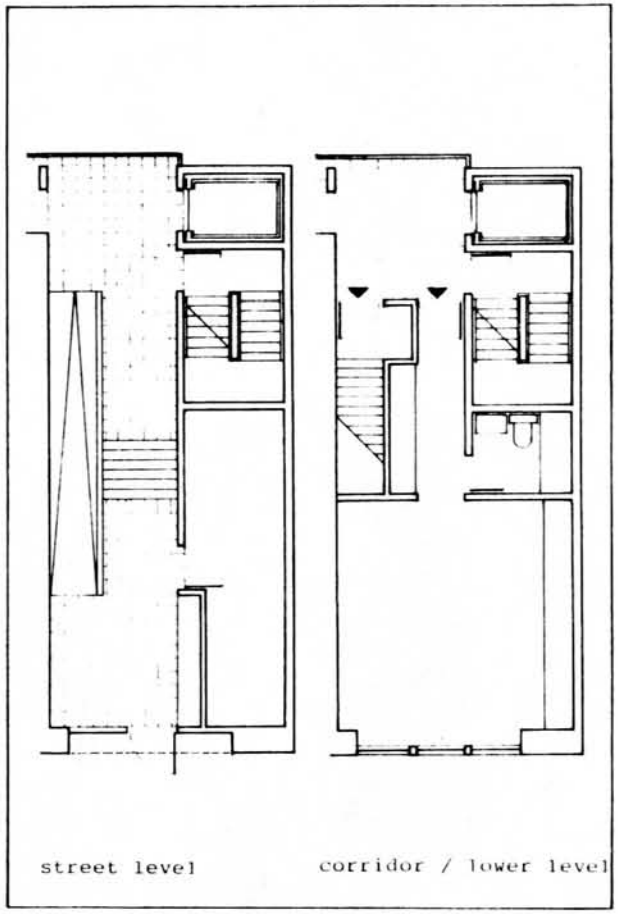
Firestairs at the end of the corridors for
a building with five or more floors

Elevator, main stairs and two small apartments
every second floor at the end of the corridor
for a building with five or more floors



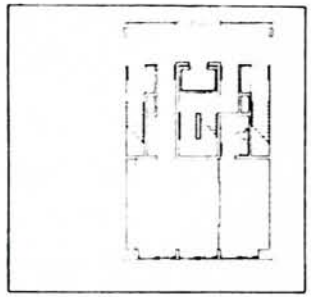


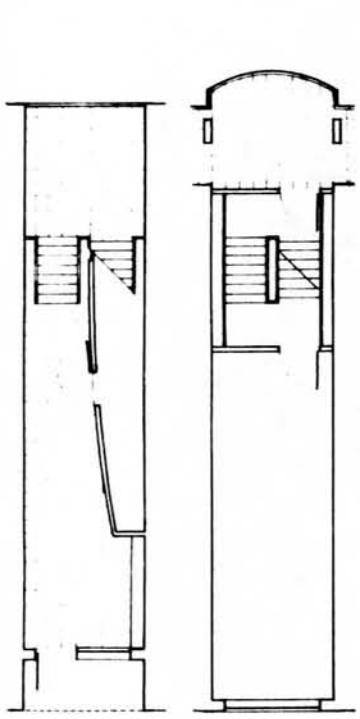




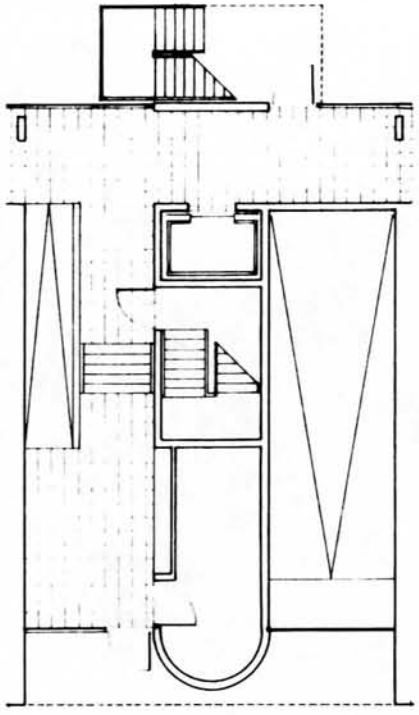
Main stairs for a walk-up building

Elevator, main stairs and three small
apartments every second floor
Outside firestairs are permitted in smaller
buildings only.

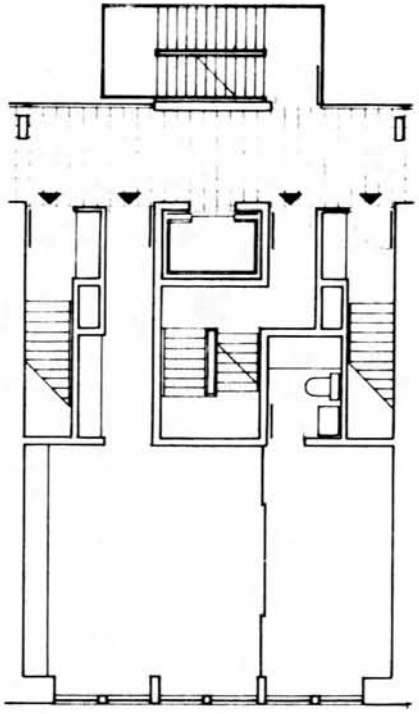




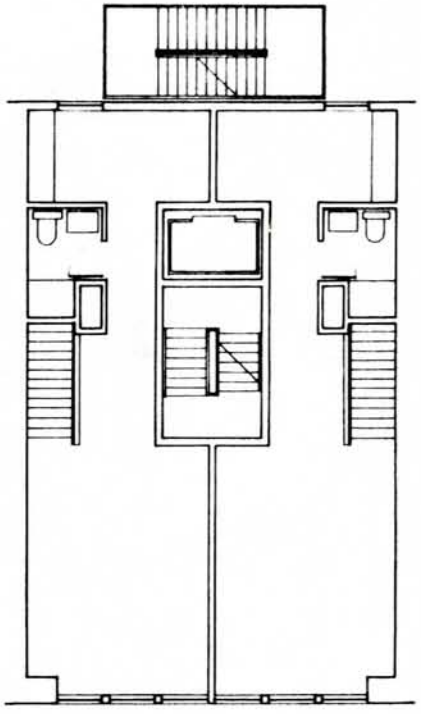
street level corridor level



street level

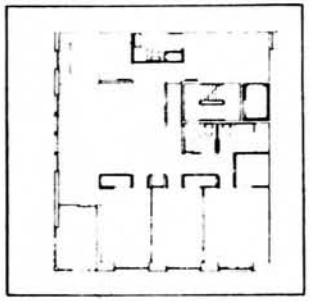


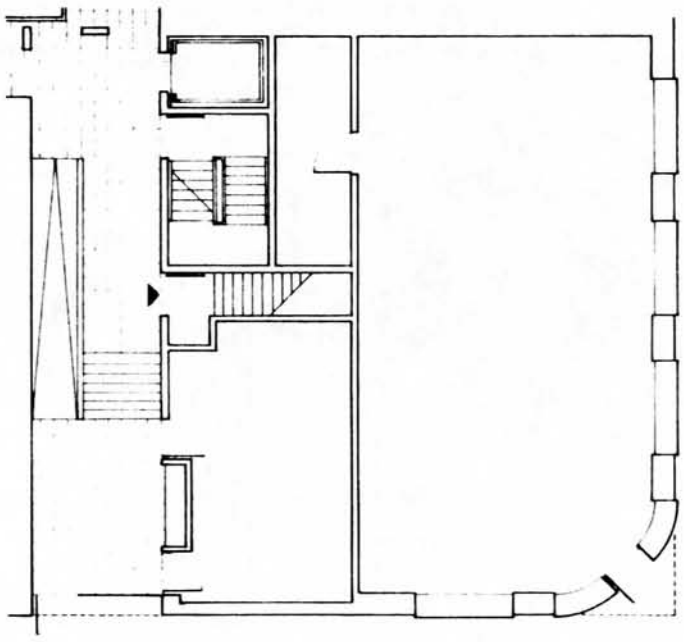
corridor / lower level



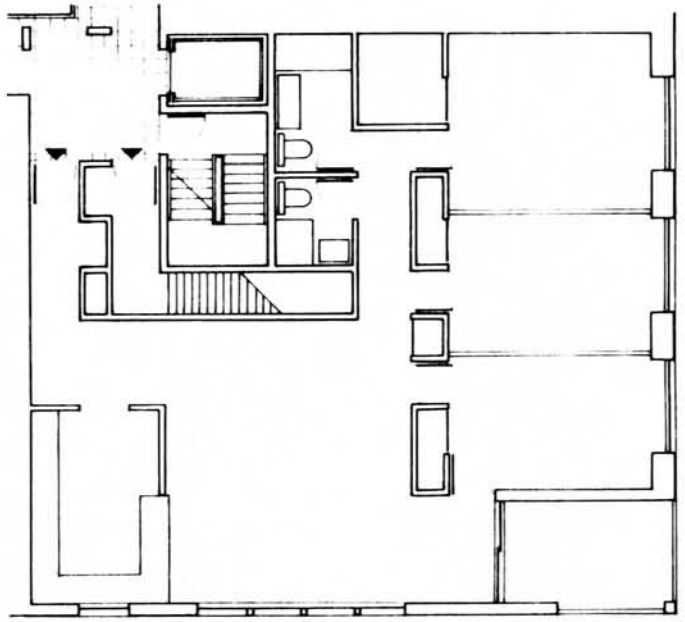
upper level

Elevator, main stairs and two, three or
four bedroom apartments every second floor
for an L-shaped building



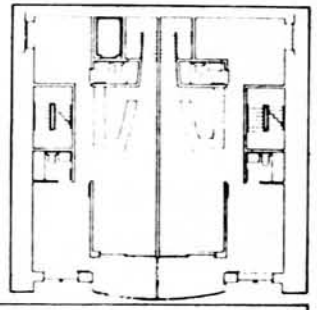


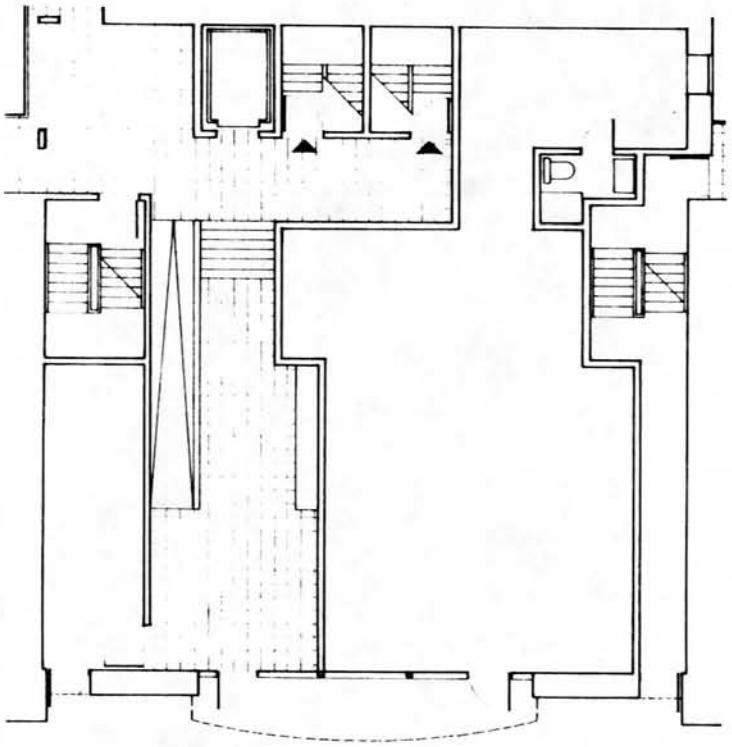
street level



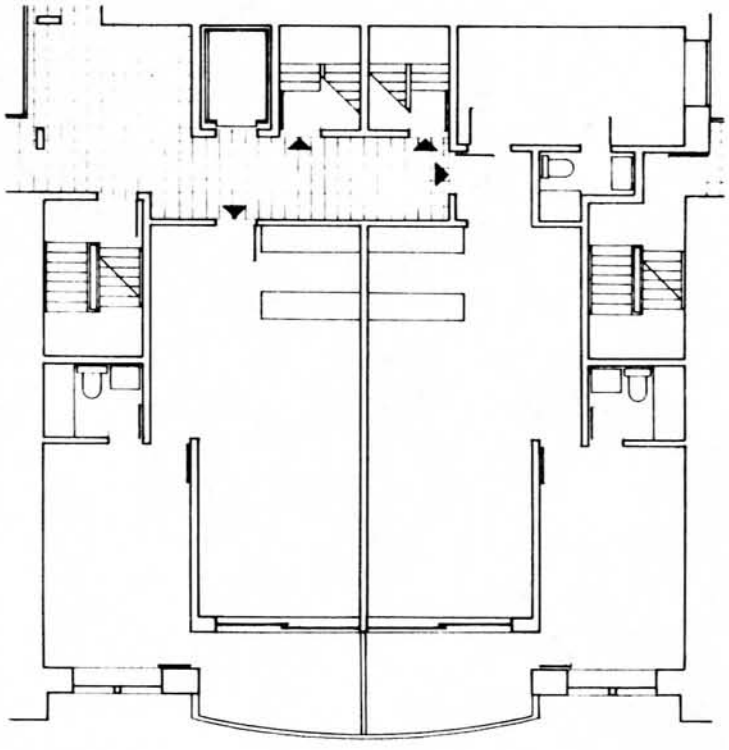
corridor / lower level

Elevator, main stairs and four one or two bedroom apartments every second floor for an L-shaped building
On one side there are firestairs for an adjacent building.



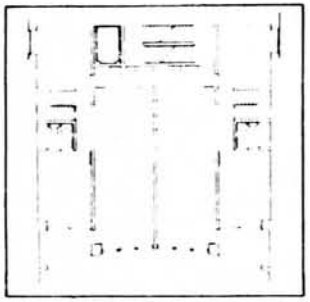


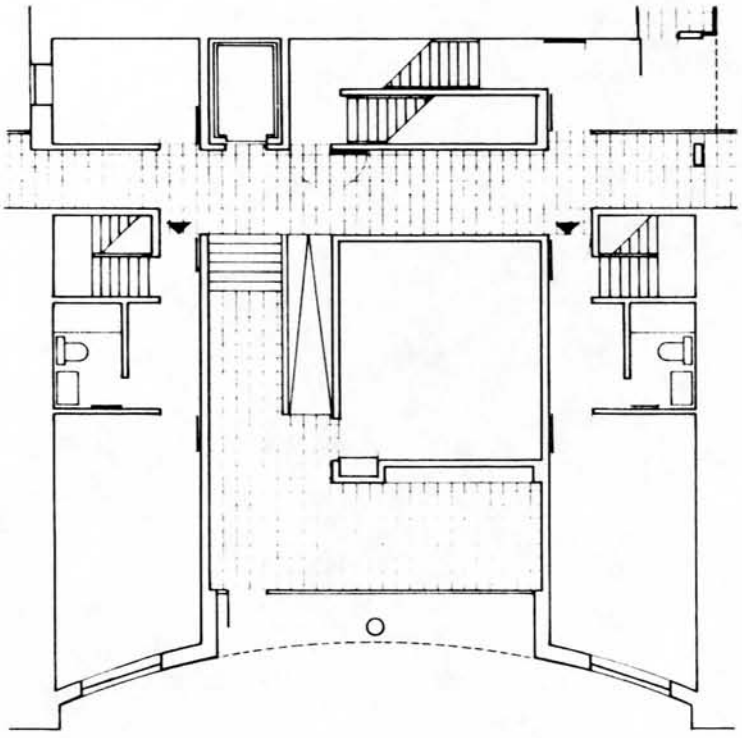
street level



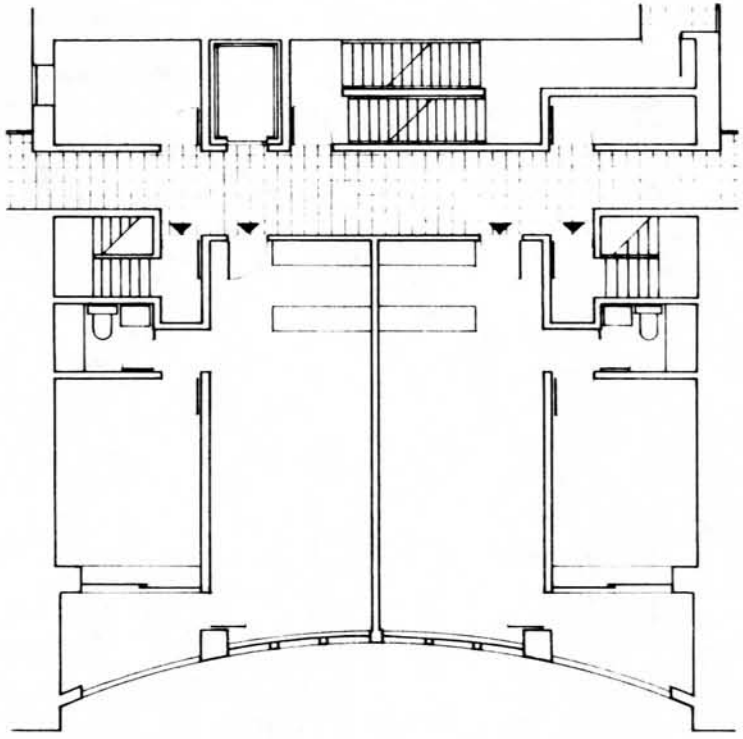
corridor / lower level

Elevator, main stairs and four one or two bedroom apartments every second floor for a linear building
In the back are firestairs for an additional perpendicular building.



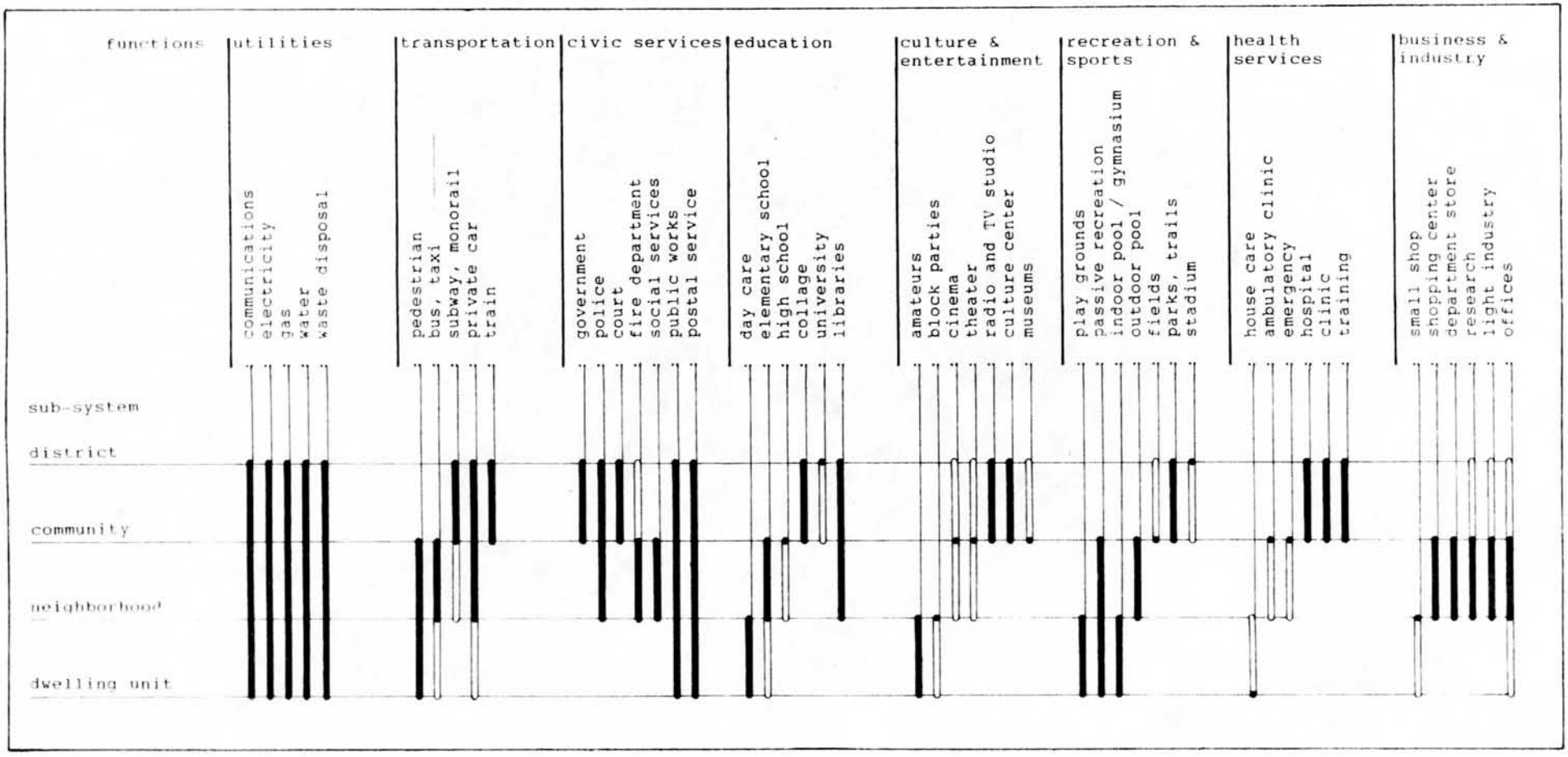


street / lower level



corridor / lower level

Functions of the Urban System

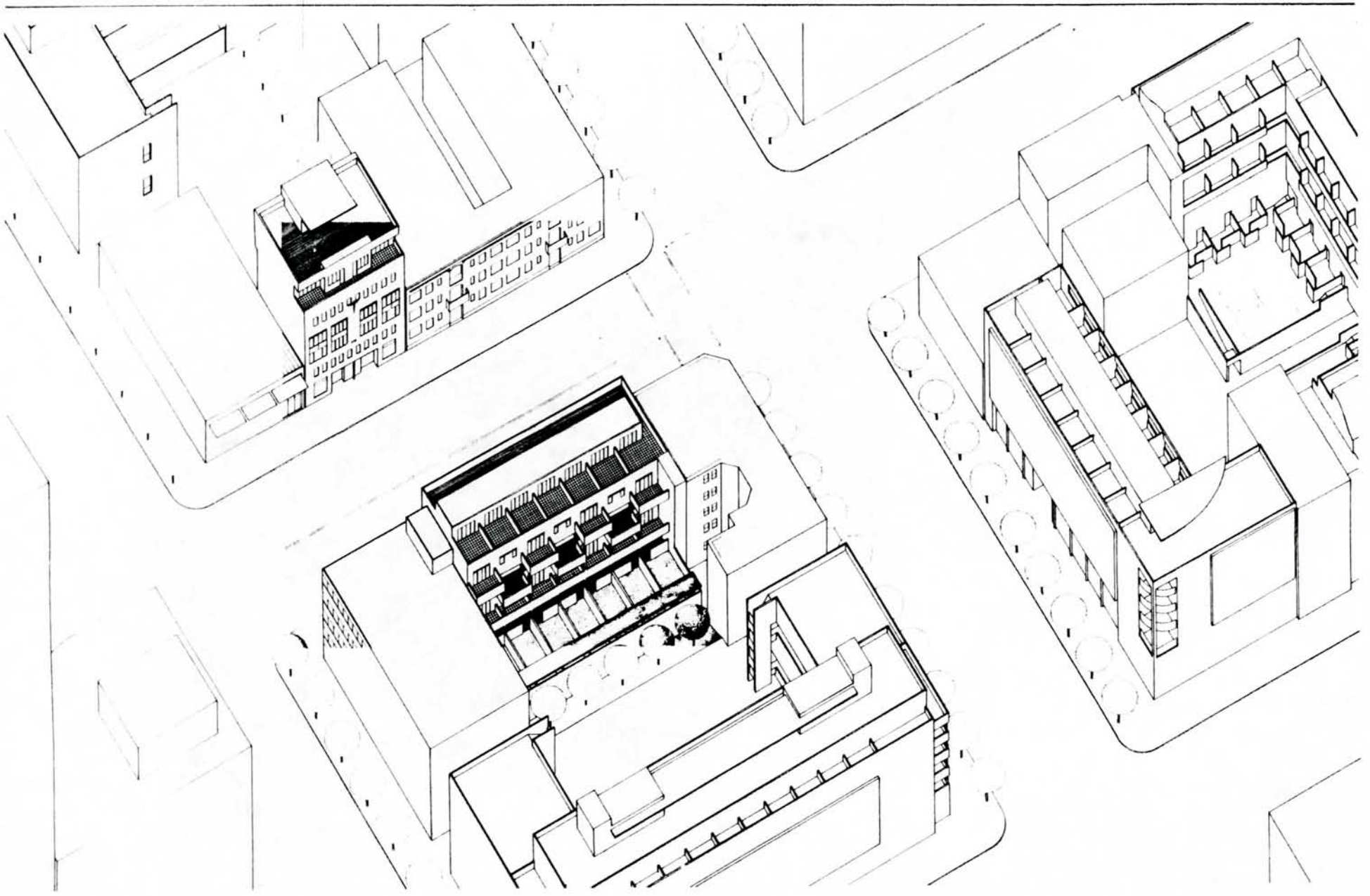


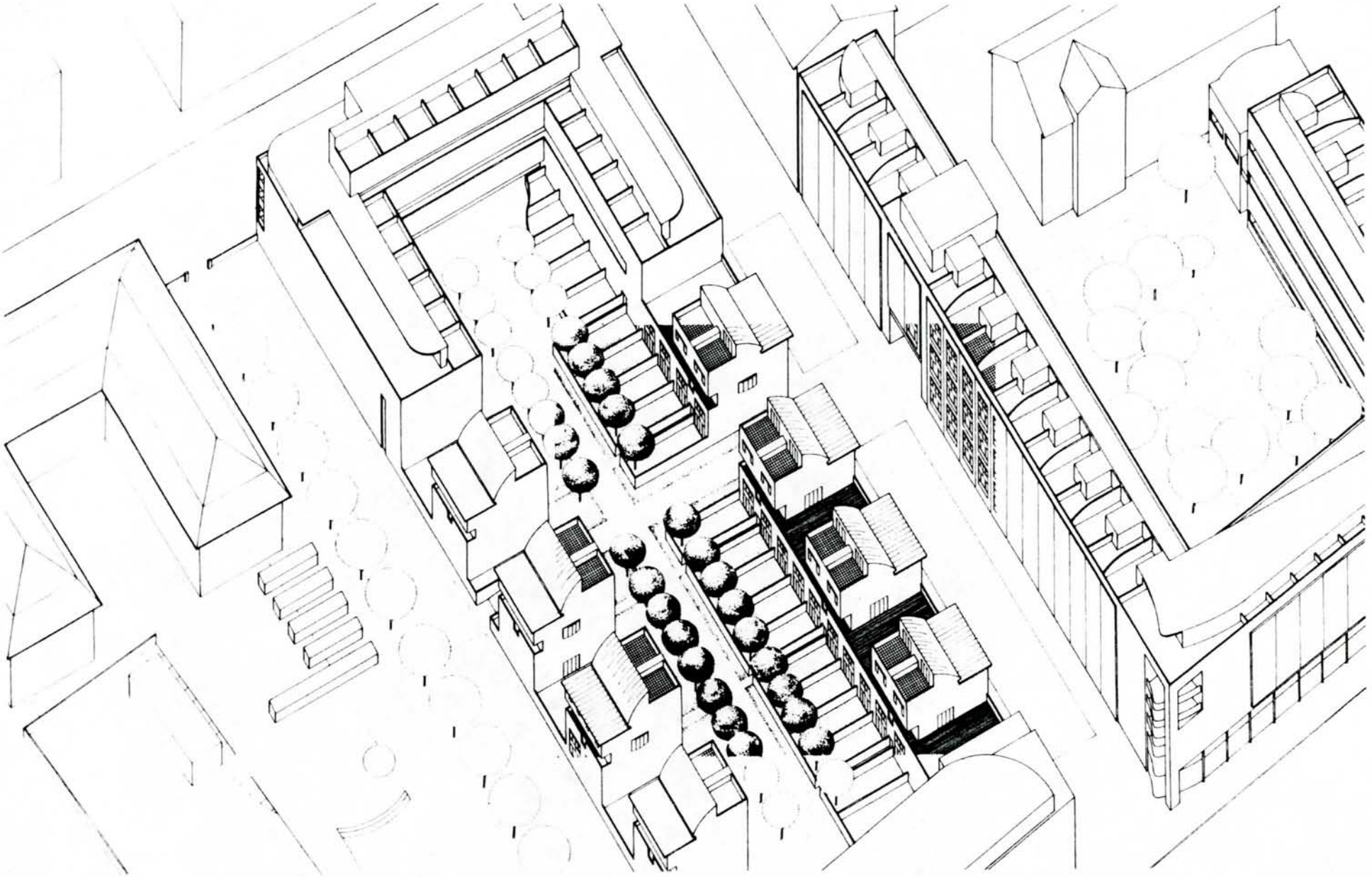
Arrangements within the "Urban Poché"

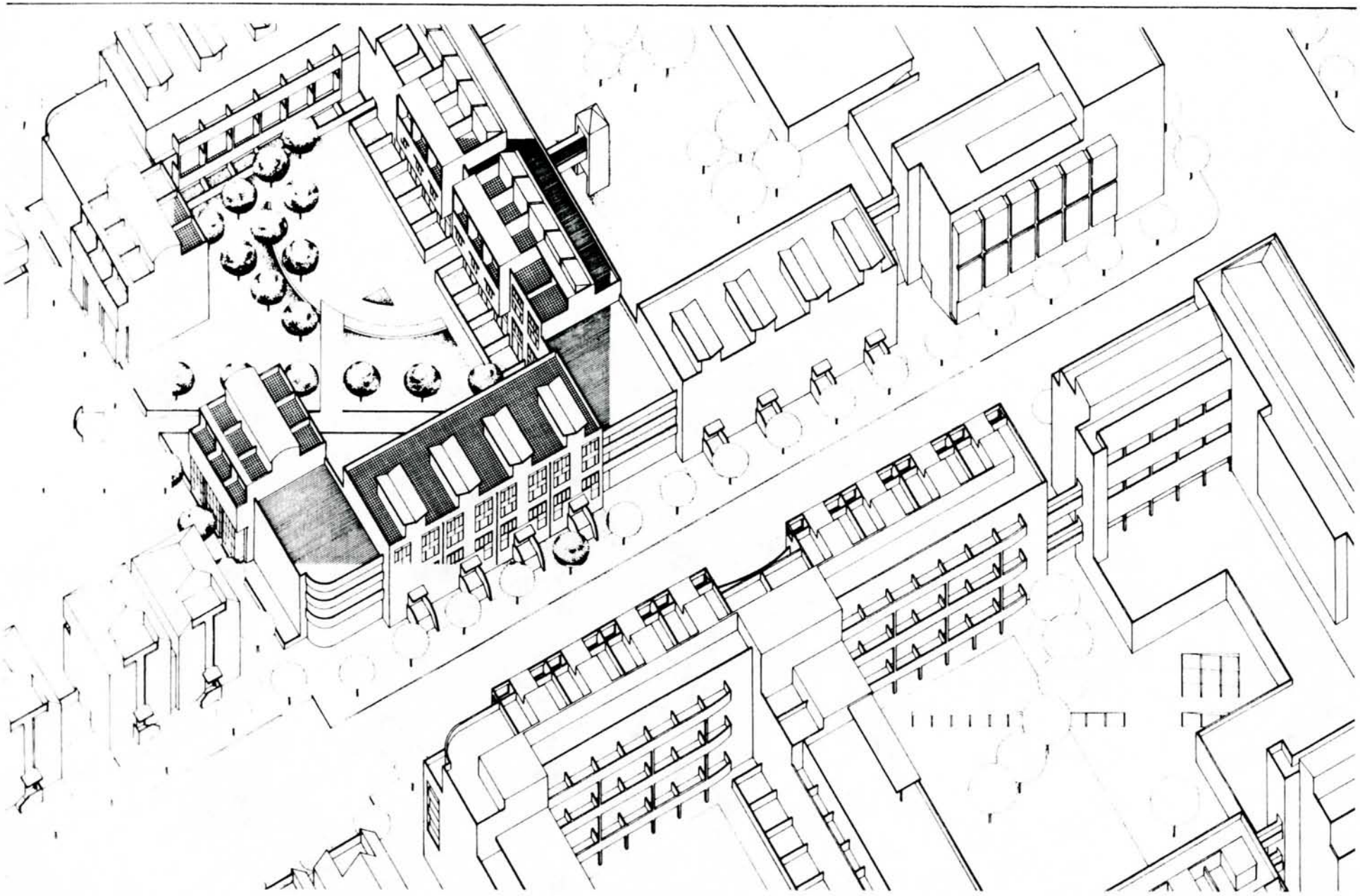
The present Dwelling unit type, the "convertible", is, as its name indicates, highly variable. Its inside divisions and expression can be changed as well as its outside form and appearance. It can be used in a wide range of differently sized and organized buildings. The number of clustered units and whether they are owned or rented will have an influence on the common facilities such as playgrounds, laundries, waste disposal or parking. Special attention has to be paid to proper dimensions and spaces that would make the actual alteration within the apartments possible, such as parking for deliverers, vertical transportation (elevator or crane) and storage close to the space to be renovated.

Functions of the neighborhood (see table "Functions in the Urban System" on the left side) can be added into the volume of the apartment house. They would once more change the design.

On the following pages are a few axonometrics showing various arrangements of "convertibles" in the "urban poché". Two represent additions in existing quarters. The other is a proposal for a new town. All of them focus on volumetric and spatial composition rather than on a final design solution.





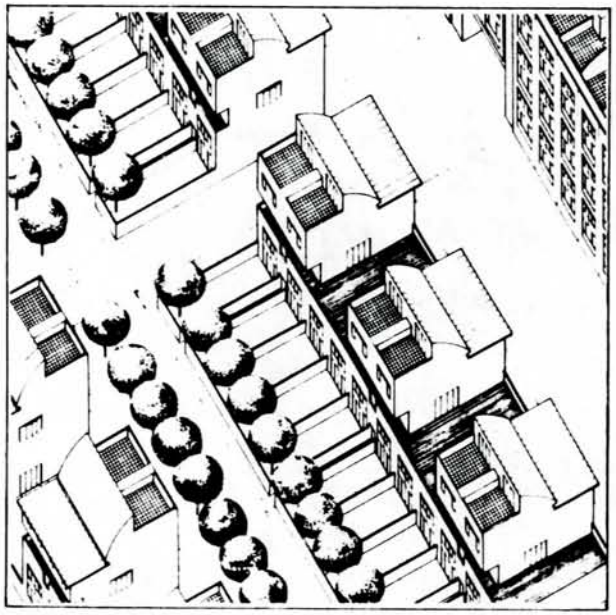


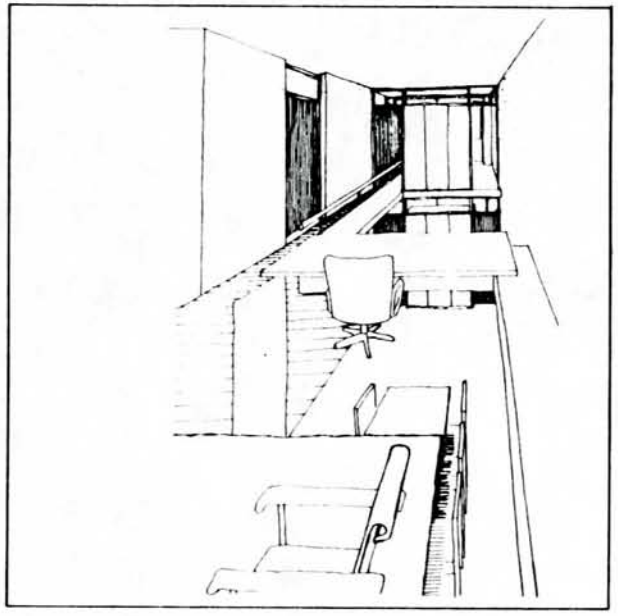
Precedents of the "Convertible"

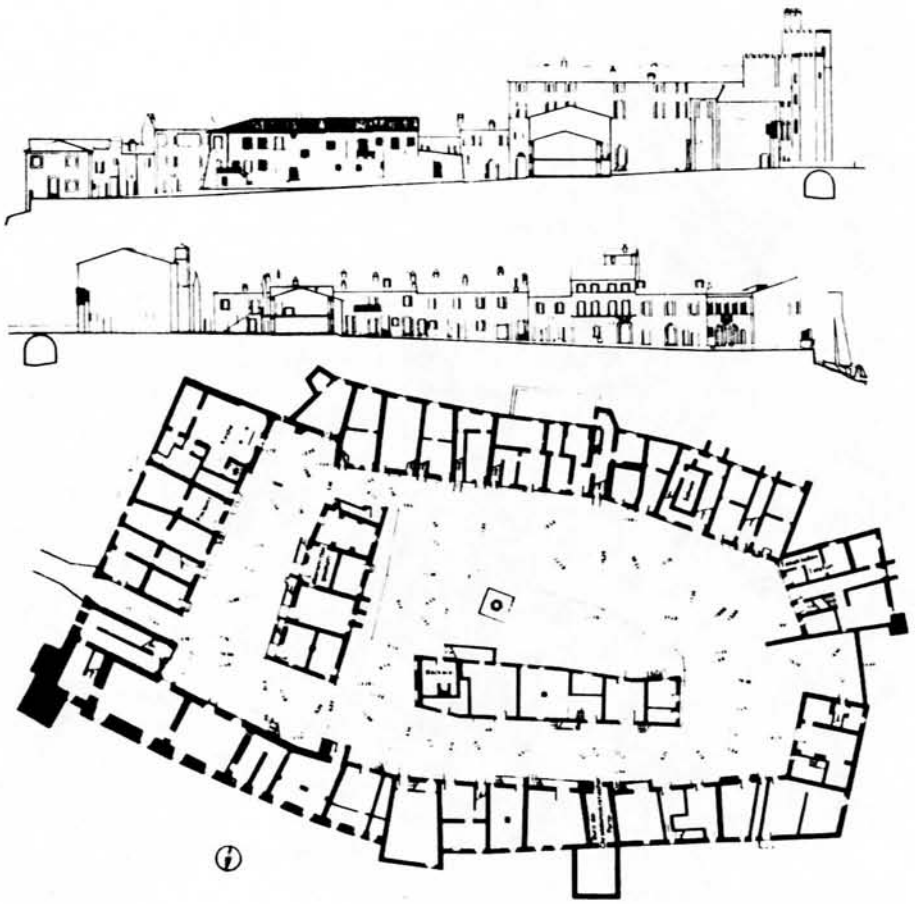
Introduction

The basic ideas of the "convertible", are already existing. We can find examples of double-oriented, open-ended apartments, buildings with exterior single-loaded corridors every second floor, and the concept of interior courtyards with access galleries. The principle of prominent front facades; to define public spaces and semi-private backyards, can be found in most cities. At least since the turn of the century there have been many attempts to provide possibilities for easy alterations of the apartments by their occupants.

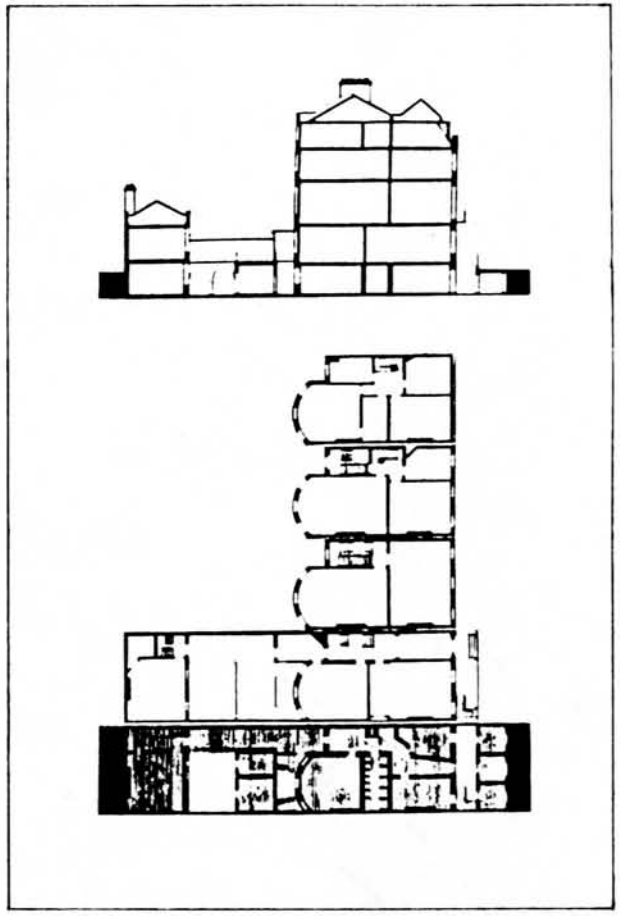
The goal of this study is to give a brief survey of precedent units, buildings, and experimental dwellings.





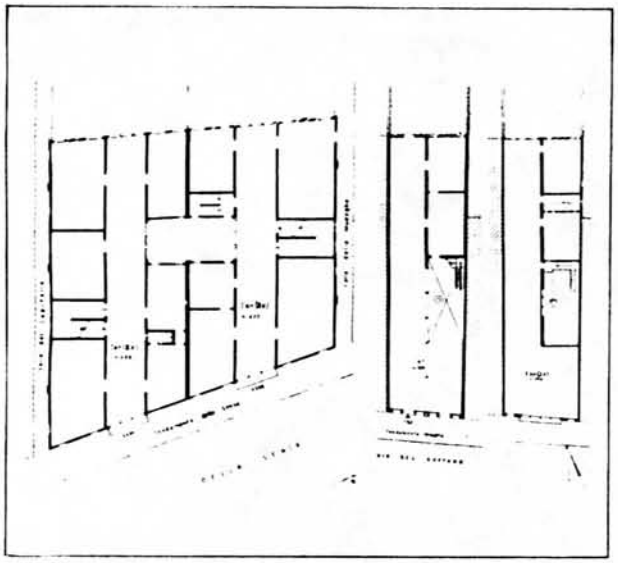


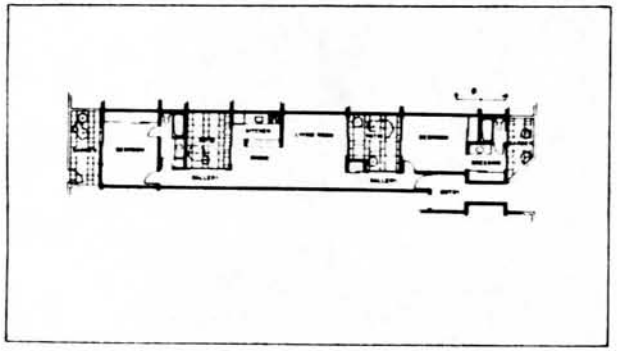
1.1 San Vittorino near Rome
Sections
Plan



1.2 Rowhouse in Bedford Square, London
Section
Floor Plans

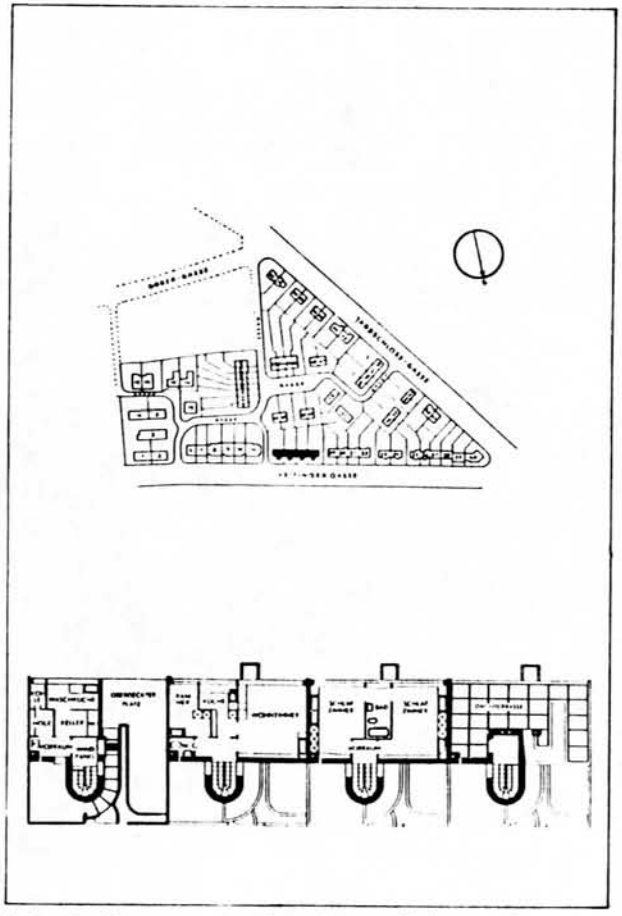
Units





1.3 Palazzi and Multi-Story Rowhouses in Venice
Plans

1.4 Housing Project in Tustin, California by Backen, Arrigoni, and Ross, 1969
Plan

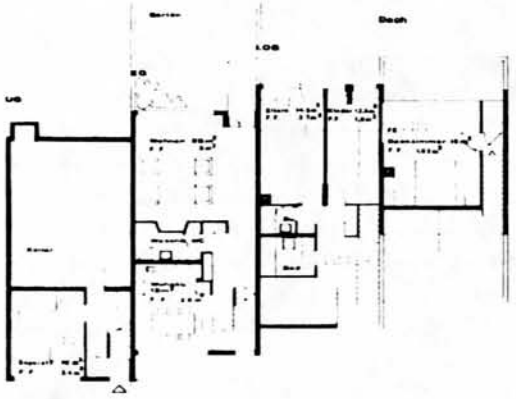


1.5 Rowhouses, Werkbund Exposition, Vienna by André Lurçat, 1932
Site Plan
Floor Plans

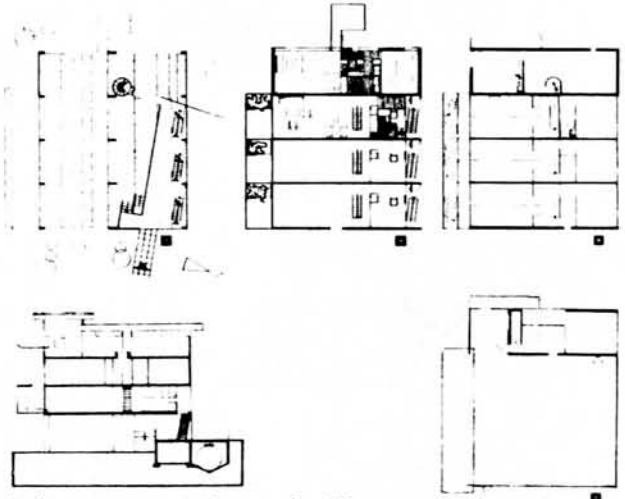
The origins of the double-oriented unit type I am working with, reach far back in time. Already in the Middle Ages we can find this unit type in urban and suburban sites, for example in San Vittorino near Rome. Throughout the centuries it was, and still is, a very popular unit type. For example, there are the nineteen century London rowhouses in Bedford Square.

The typical units require open spaces at each end. Most of them face a public street or square and have a private backyard with gardens, stables, outhouses, or courts with small factories on the other side.

There is a wide range of proportions and dimensions in plan and section. If the unit is very deep, light is minimal within the volume. Interior courtyards, skylights or auxiliary means of lighting the interior have to be used. Two examples for courtyard buildings are the typical Venetian multi-story rowhouse of the seventeenth century and the single-story patio housing project in Tustin, California from 1969. Wide, but shallow units certainly do not have light problems. Each room can span from the front side to the back side. In the very extreme case, there is not enough space for all the core elements (kitchen, bathrooms, stairs); some of them will project out of the main volume, as can be seen for instance in Lurçat's rowhouses at the Vienna Werkbund Expposition.

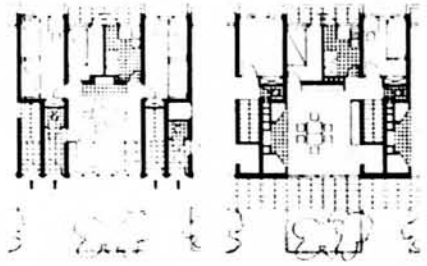


1.6 Settlement Eiwog Dinhard ZH, Switzerland
by Fritz Schwarz, 1972-74
Typical Floor Plans
Section

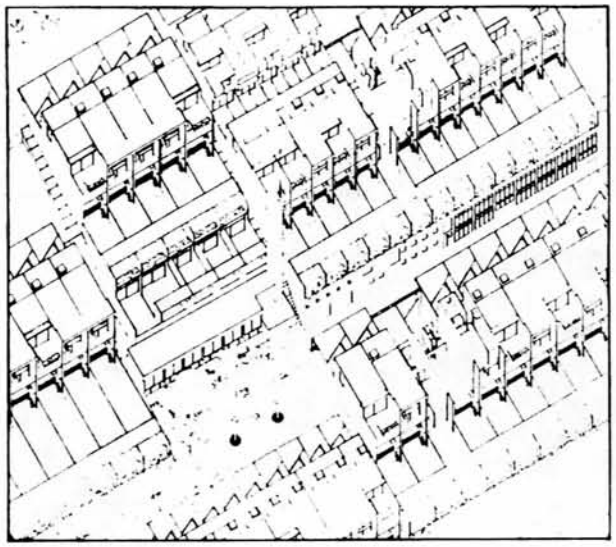


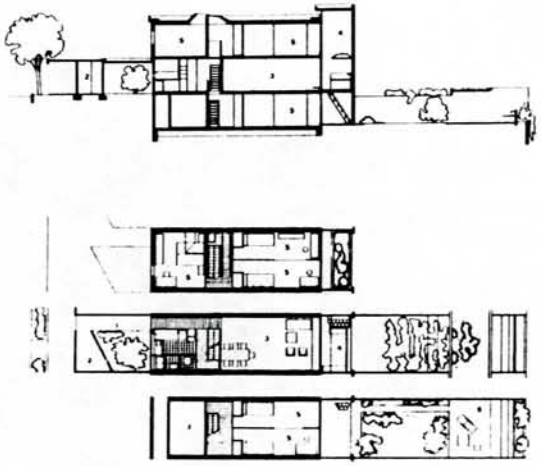
1.7 Apartment House in Flamatt, Switzerland
by Atelier 5, 1957
Floor Plans
Section

The double-oriented, open-ended unit is very popular for dense low-rise housing even today. Depending on the layout in plan and the treatment of the vertical surface, each individual rowhouse unit can be recognized, as shown with the example of Eiwog Dinhard ZH. Several units together can form one apartment house and still provide private access to each unit. A good example is the apartment house in Flamatt by Atelier 5. In many cases, the individual unit disappears within the whole settlement. Three examples are rowhouses in Rotterdam by J. J. P. Oud, the Halen Siedlung near Berne by Atelier 5 and the Fleet Road terrace housing in London by Neave Brown.

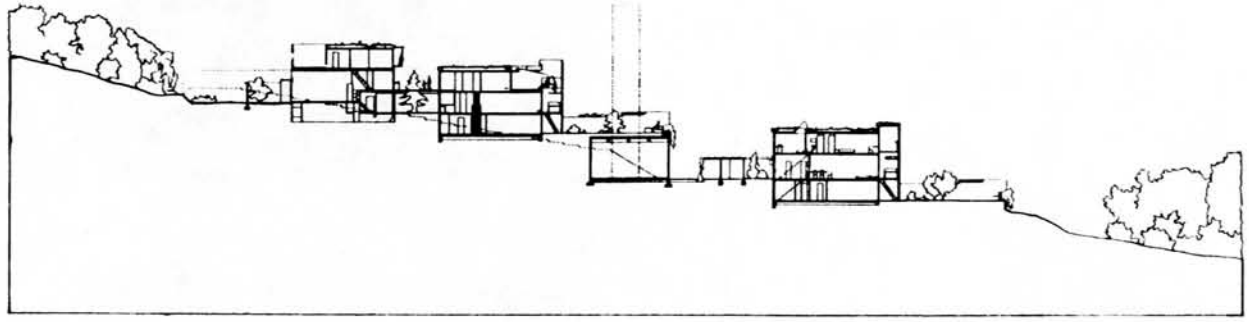


1.8 Rowhouses in Rotterdam
by J.J.P. Oud, 1924
Site Plan
Floor Plans

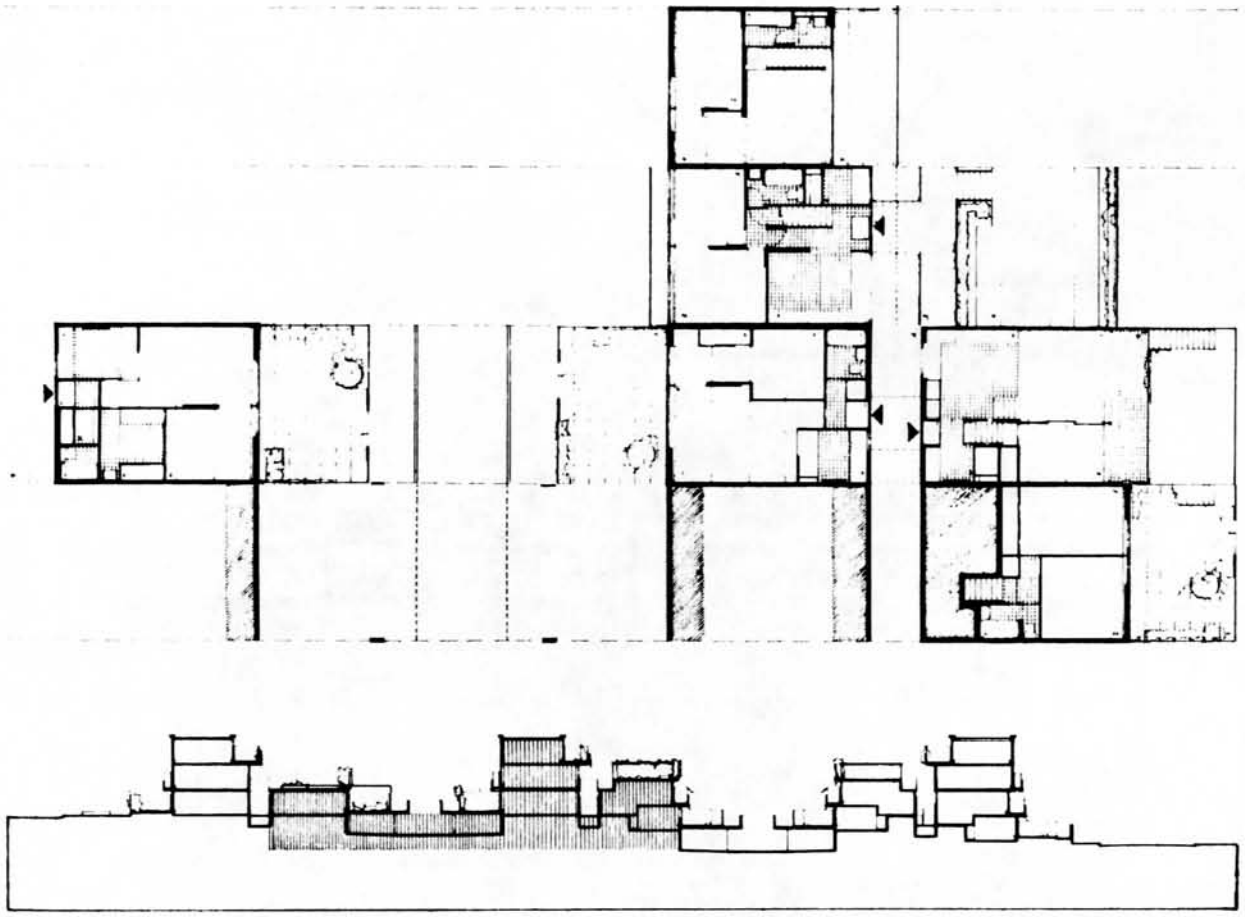




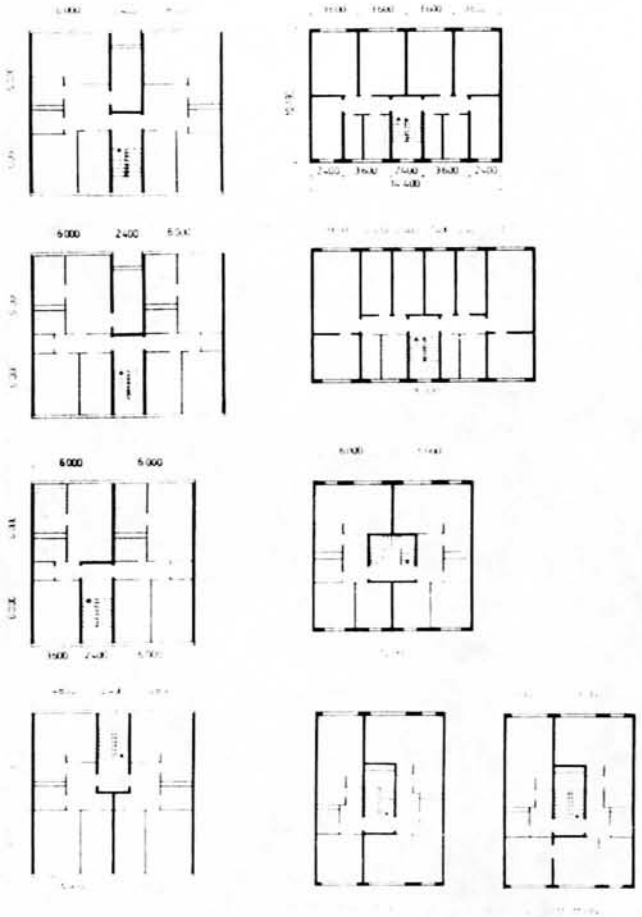
1.9 Halen Siedlung near Berne
by Atelier 5, 1963
Axonometric



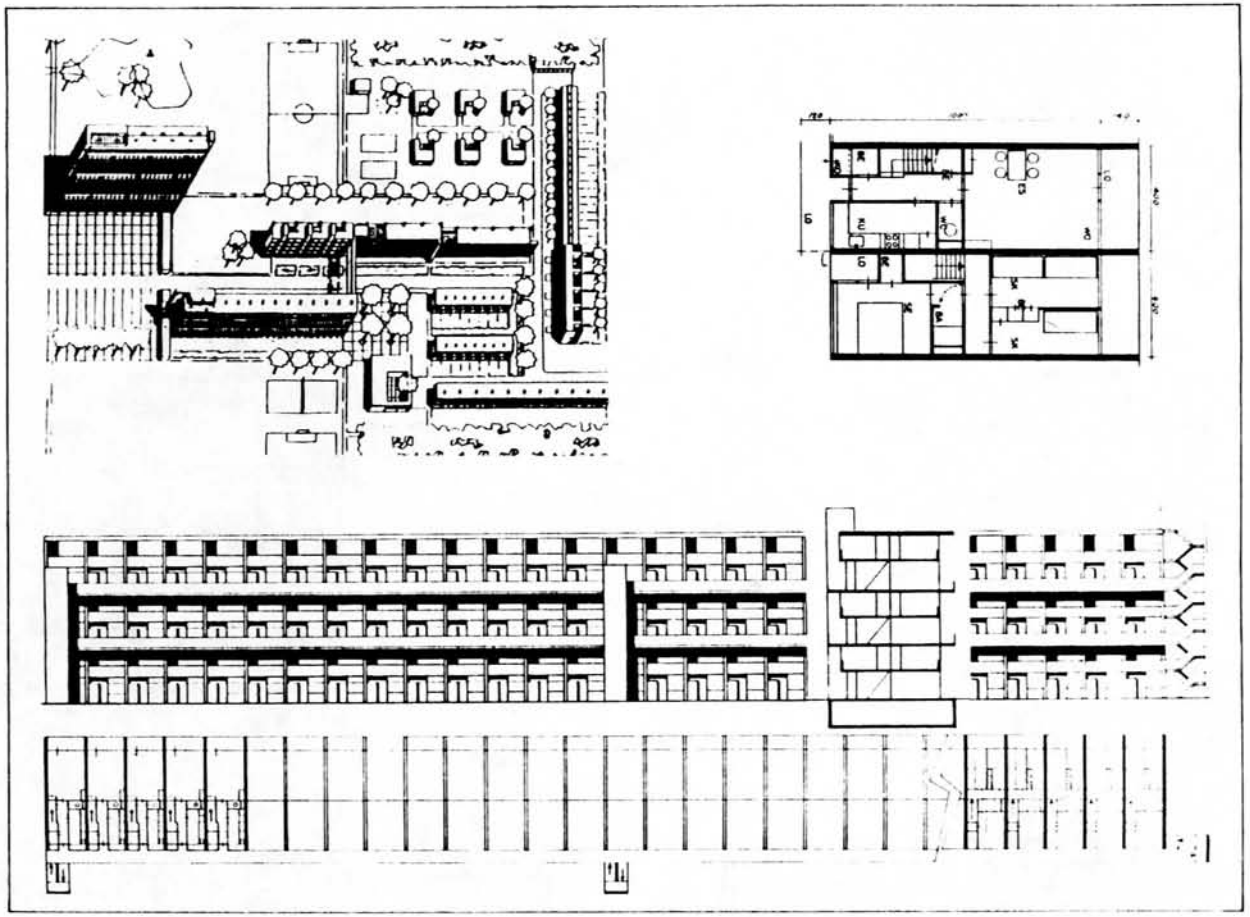
1.10 Typical Unit, Section
Typical Unit, Floor Plans
Site Section



1.11 Fleet Road Terrace Housing, London
by Neave Brown, 1967
Floor Plans
Section

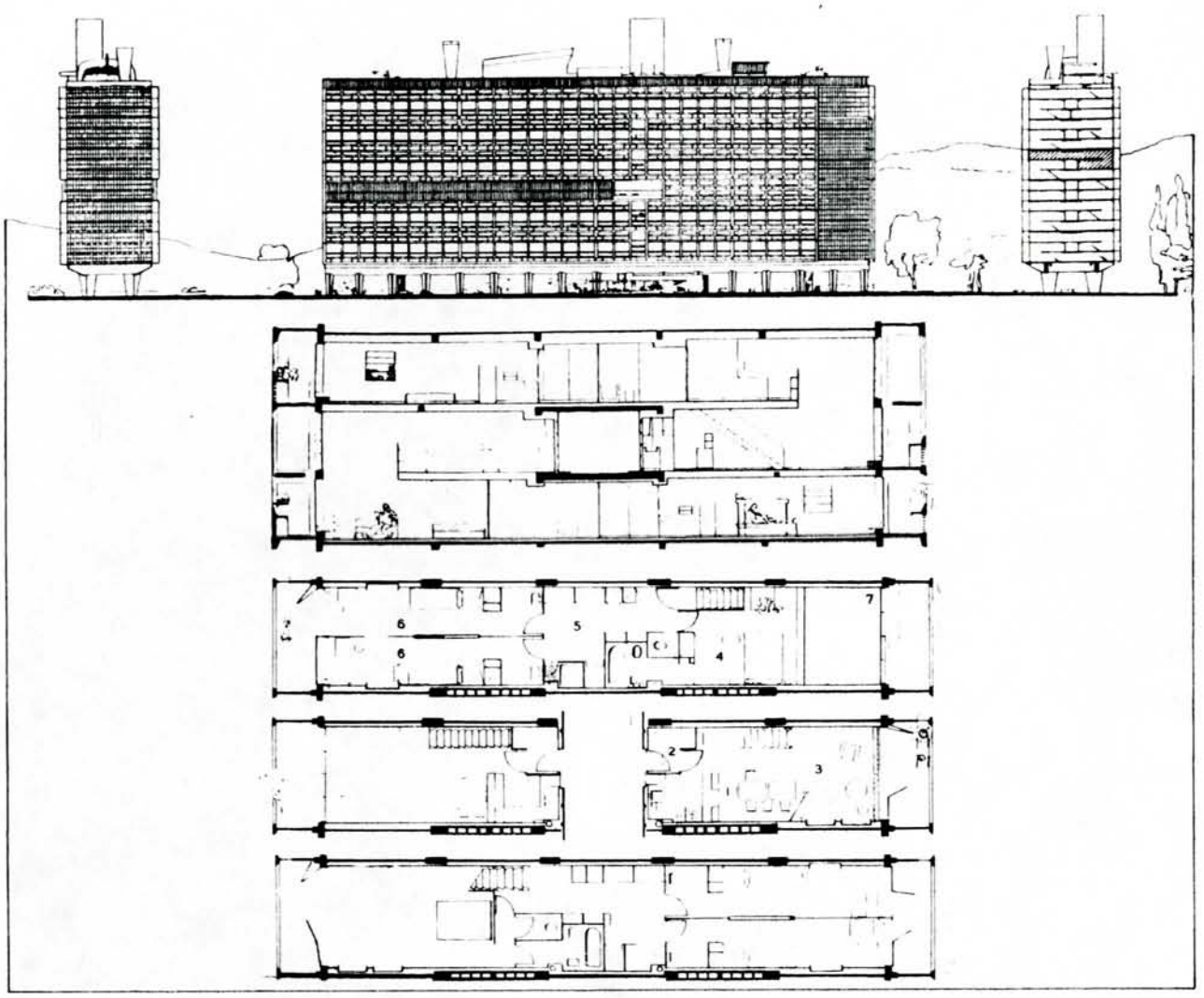


1.12 Standard Floor Plans for Apartment
from the German Democratic Republic
by Kress and Rietdorf, 1972

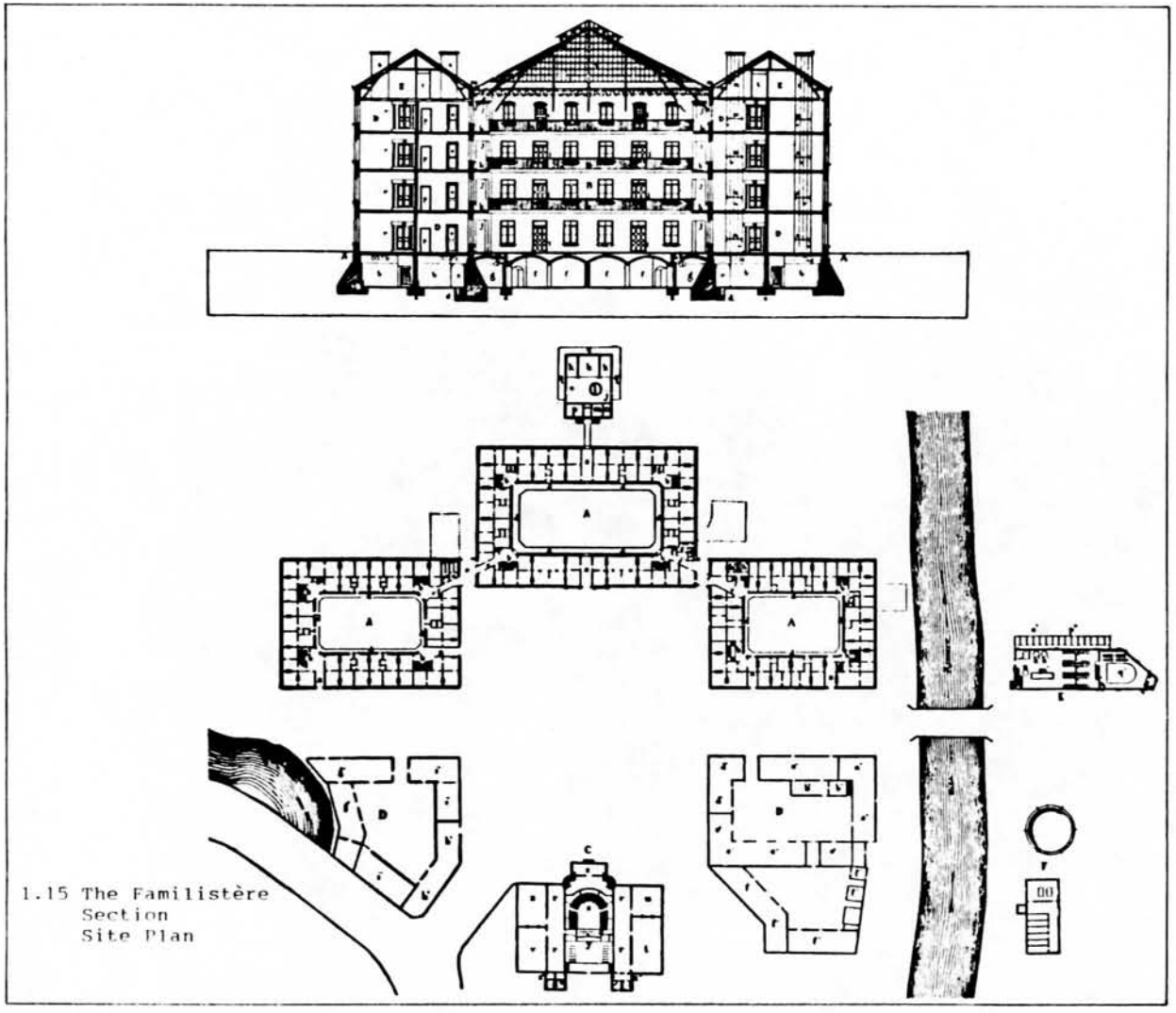


1.13 Six-Story Apartment House
by Bakema and van den Broek, 1959
Context Axonometric
Typical Unit, Floor Plans
Elevation, Section
Plan

The unit is also used in very different high-rise projects, in buildings with multiple vertical access, with exterior as well as interior corridors. Multiple vertical access is a very popular solution in Europe, often used for four to five stories walk up apartment houses, as shown in a series of standard floor plans for apartment houses from the German Democratic Republic. The six-story apartment house with duplex units by Rakemo and van den Broek stands for another, common building type: the one with exterior, single-loaded corridors. The interior, double-loaded corridor type knows many sophisticated examples in the States, but its most famous example is certainly Le Corbusier's Unité d' Habitation in Marseille.



1.14 Unité d' Habitation in Marseille
by Le Corbusier, 1945-52
Elevations, Section
Typical Unit, Section
Typical Unit, Floor Plans



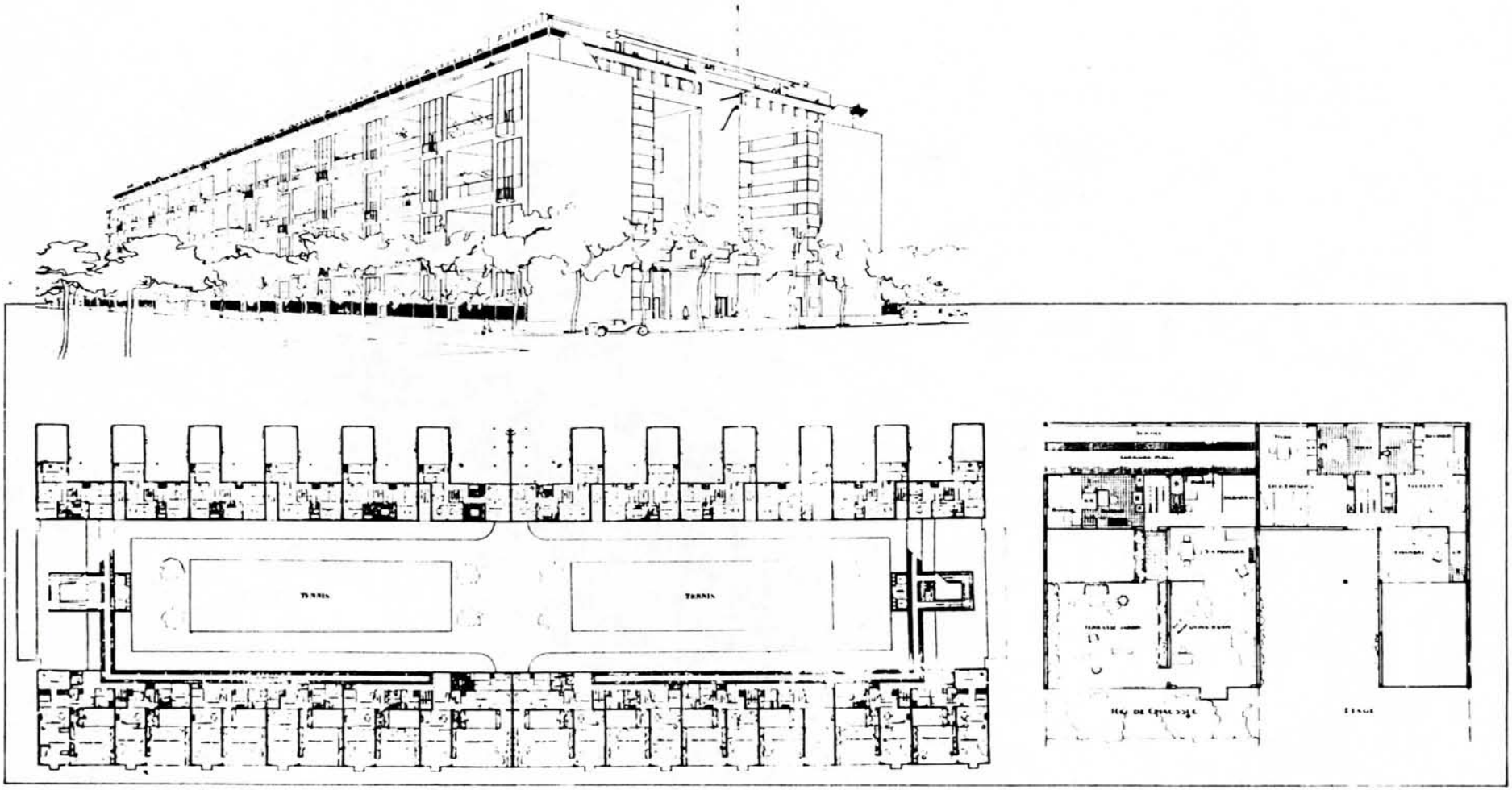
1.15 The Familistère
Section
Site Plan

Buildings

The following examples of buildings have three qualities in common: all are multiple dwelling projects inhabited by individual families, the entrances to the apartments on the upper floors are from exterior, single-loaded corridors, and all projects make a distinction between the street side and the garden side.

The Familistère
Guise, France, circa 1860
by Jean Babtiste André Godin

Godin, a cast iron products manufacturer, built near his plant the so called "Familistère" for his employees. The principal arrangement of the buildings and the organization of the community was a revised version of the philosophical and political ideas for the new society of the Frenchman, Charles Fourier (1772-1837). Three four-story apartment houses form the main part of the block. Each of them has a covered interior courtyard with galleries providing access to the apartments. The courtyards have also been used as playgrounds, for assemblies or block parties. Together with the buildings with the school, a theater, stables, shops and a restaurant, the three apartment houses define a central square. Other buildings on the property accommodate a day care, a public bathroom with an indoor pool and the gas works.

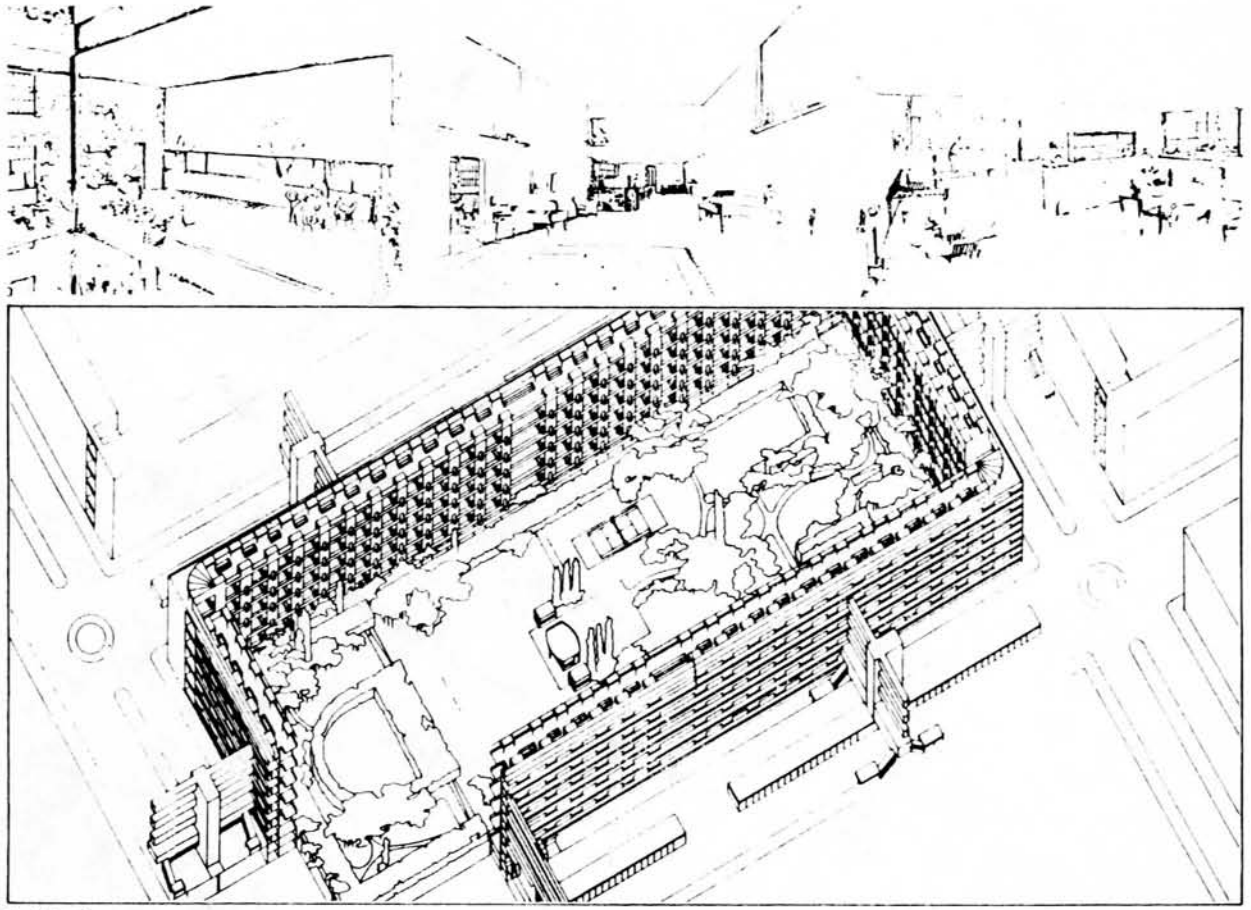


1.16 The Immeuble Villas, Paris, 1922
Perspective View
Building Plan
Typical Unit, Floor Plans

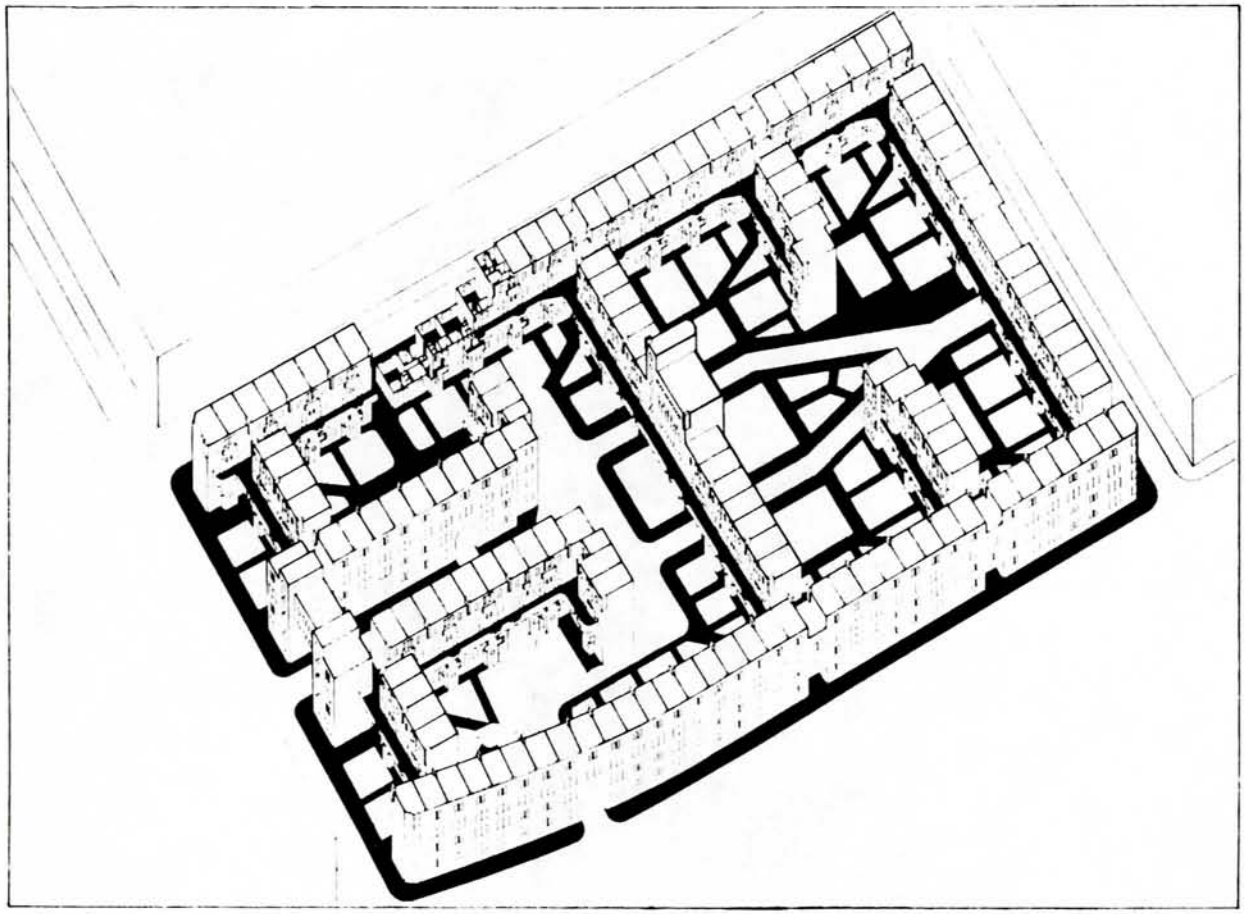
The Immeuble Villas
Paris, 1922-1929
by Le Corbusier

As a new solution for city housing, in 1922 Le Corbusier proposed the "Immeuble Villas". It consists of about 120 double-story villas within a huge ten-story building. Each villa has an L-shape solid and a double-story garden cubic void. The garden and a double-story living room face a boulevard. The entrance, the kitchen and a room for a servant are on the lower level, facing the access gallery in the back. On the upper level there are three bedrooms oriented towards the interior court.

In a later transformation, Le Corbusier inverted the whole building. Access galleries and bedrooms now face the streets with the vertical access elements and underground parking garages, whereas the gardens and the living rooms are oriented towards an interior park.



1.17 The Immeuble Villas, Paris, 1922
Perspectives
1.18 The Immeuble Villas, Paris, 1929
Axonometric

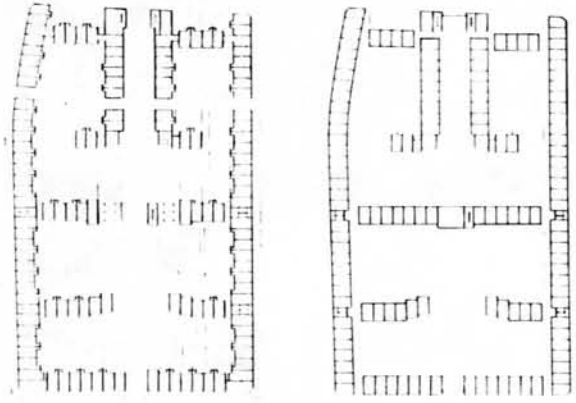


1.19 The Spangen Quarter
Axonometric
Typical Units, Floor Plans

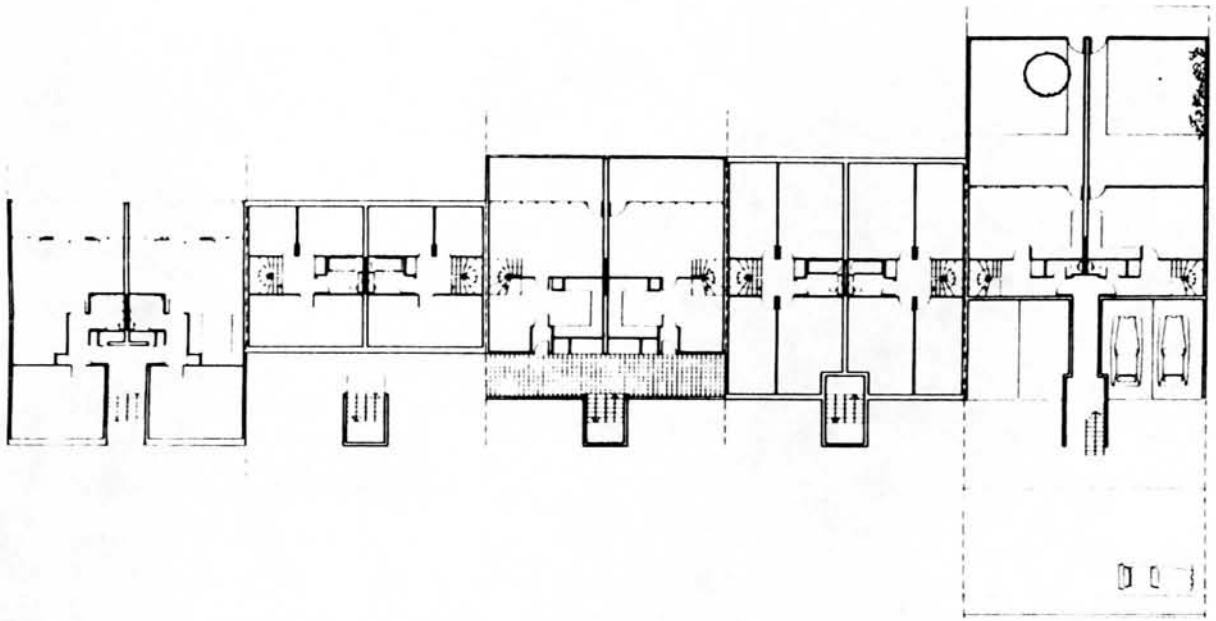
The Spangen Quarter
Rotterdam, 1919-1921
by Michiel Brinkman

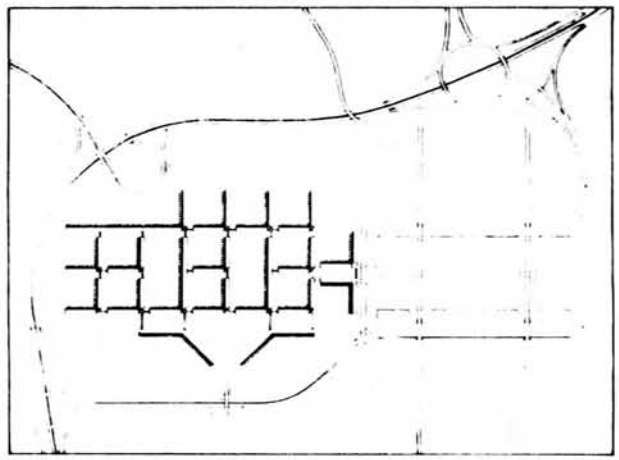
A four-story high rectangular block of about 470 by 260 feet contains about 260 three bedroom apartments. The interior garden, which provides access to the units, is divided into two courtyards of more or less the same size that are further divided by wings projecting from the main block. In the central traverse wing there are common facilities such as laundry, washrooms, a children's play space and the heating plant. Above flats in the first two floors, there are double-story apartments accessed by an open, external gallery on the third floor.

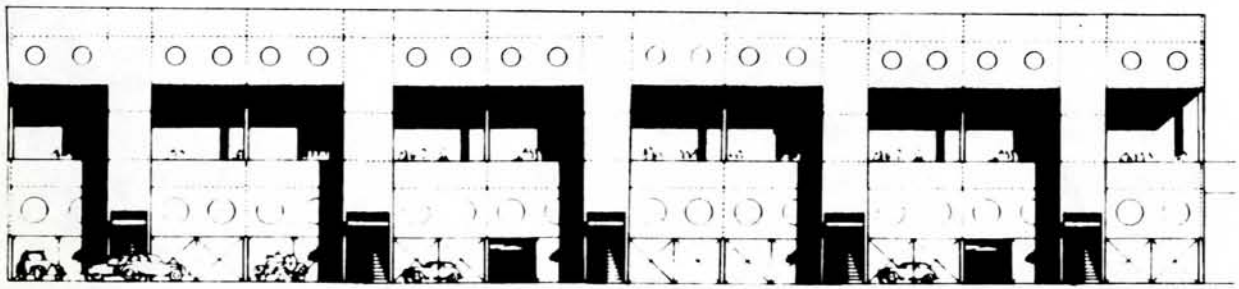
The building is plain, mostly wall, on the street side. The garden side is highly articulated with the freestanding gallery, the balconies, and the many windows, doors, and chimneys.



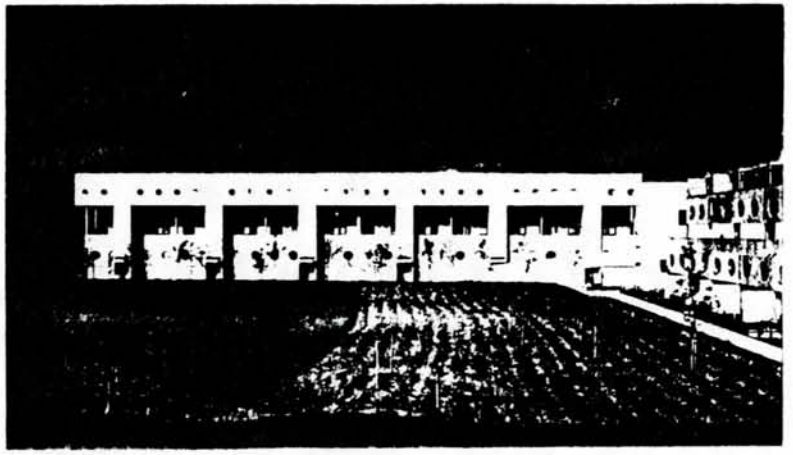
1.20 The Spangen Quarter
Site Plan
Gallery Plan

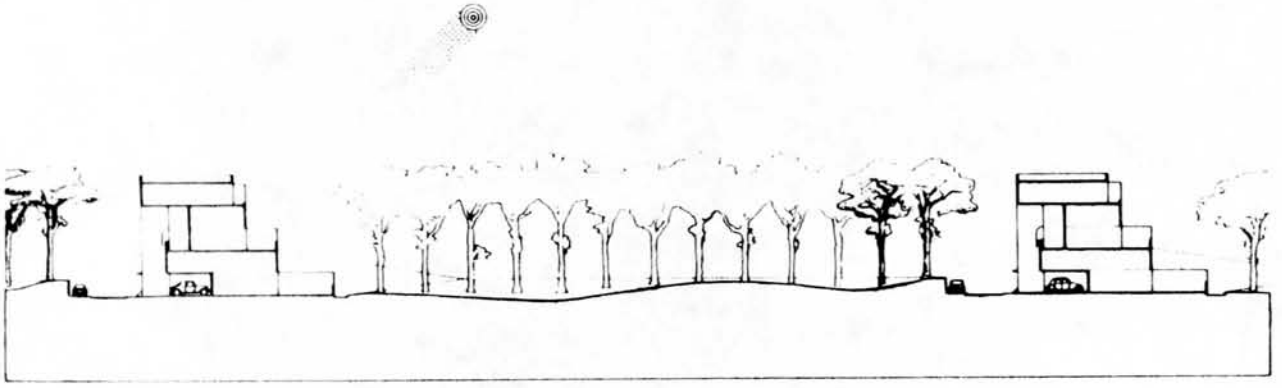






1.21 Town Center Housing, Runcorn New Town
Typical Unit, Floor Plans
Street Elevation
Site Plan



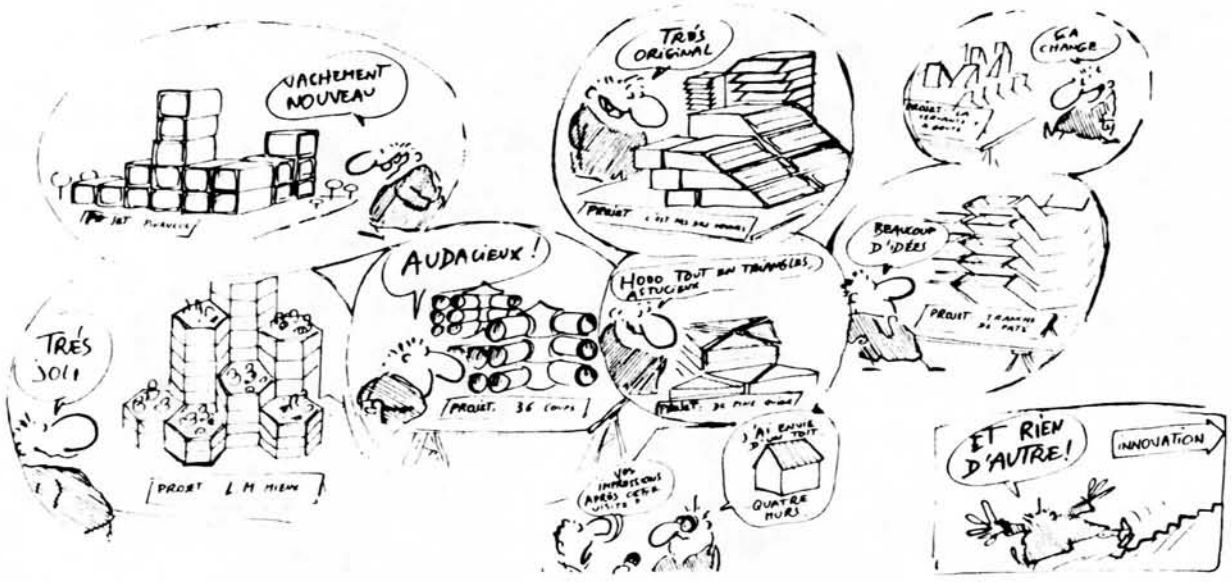


I.22 Town Center Housing, Runcorn New Town
Section

Town Centre Housing
Runcorn New Town, 1968
by James Stirling and Partners

The low cost housing project for about 6000 people in Runcorn New Town consists of five-story building units, that can be added along a network of access roads and elevated pedestrian walkways. To avoid concentration of a particular social group, apartments of different sizes are contained within each unit. On the ground floor, there are four garages and two four bedroom duplexes with a private garden. On the third floor, accessed directly from the pedestrian walkway, there are two three bedroom duplexes. Two one bedroom apartments are on the top floor. Each unit has on one side a stair that connects the ground floor (road access) with the third floor (pedestrian walkway) and the top floor. On the other side, each apartment has an uncovered, private outdoor space facing a park.

Contrary to the other precedents, Runcorn does not clearly define public and private spaces. For once, the park spaces have streets on two sides and gardens on the other two. Also, there are special corner units missing, therefore the joints of the bars and the corners are loosely defined; they appear unfinished.



Experimental Dwellings

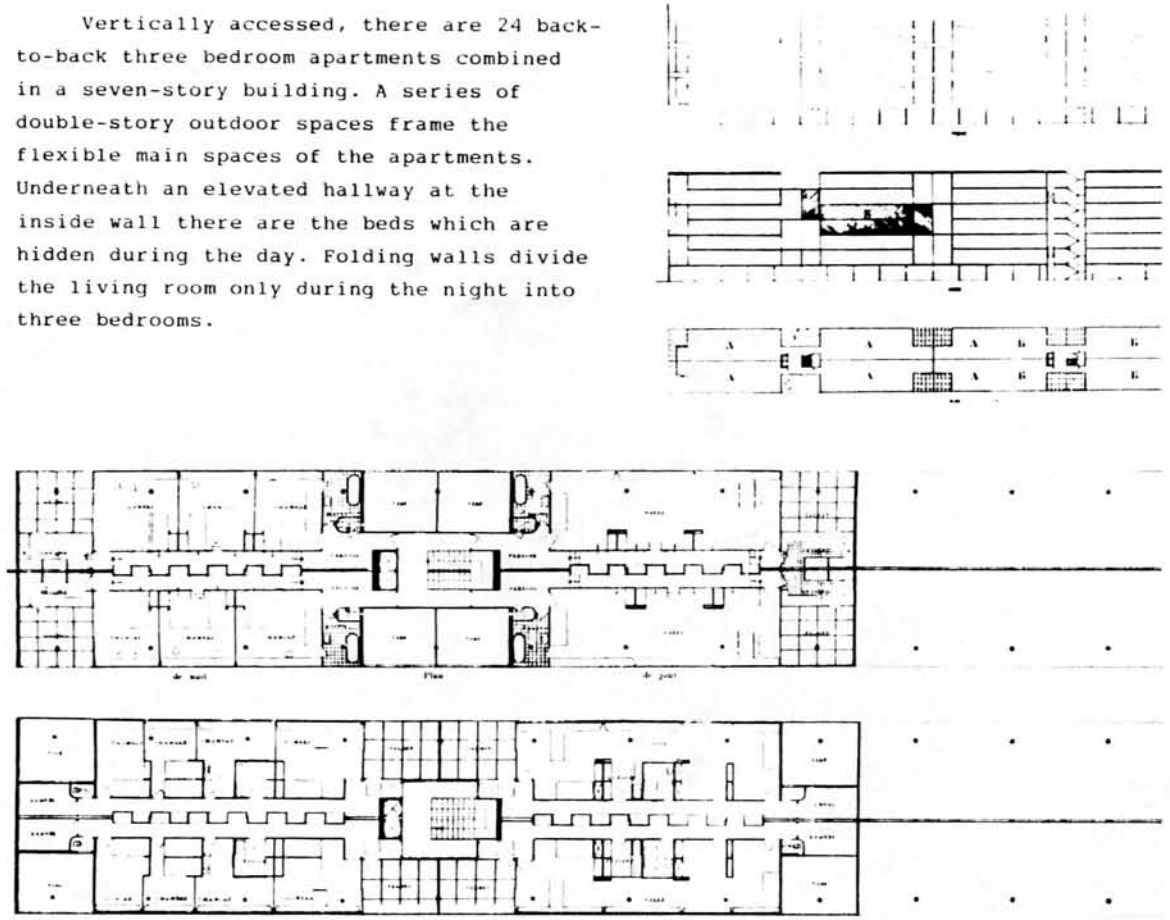
In the last chapter of this survey I am looking at one special aspect of the experimental dwellings: the different attempts to provide possibilities for alterations to be done by the occupants. I will put the examples in a logical order: from flexibility to variability. By coincidence they will be at the same time in a more or less chronological order. What do flexibility and variability mean in this context?

Flexibility means the apartment's ability to suit instantly changing demands with its given elements such as mobile furniture, sliding walls, doors and curtains. Most attempts to design flexible apartments try to satisfy the different requests of day and night use within limited space.

Variability means the apartment's potential to allow changes of the quantity and the quality of its rooms according to the changing number of family members or the change of lifestyle. Most attempts to design variable apartments establish a structural and a mechanical system that can allow alterations with simple means. This makes it also easy for the occupant to be involved in the planning and constructing process.

Immeuble Locatif
Stuttgart, 1928/1929
by Le Corbusier

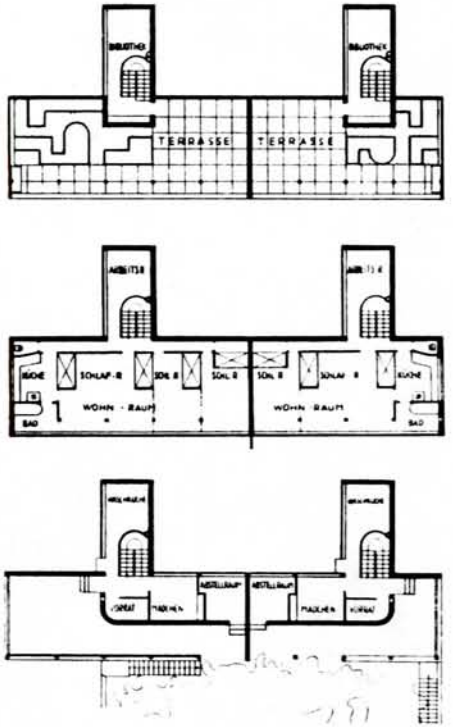
Vertically accessed, there are 24 back-to-back three bedroom apartments combined in a seven-story building. A series of double-story outdoor spaces frame the flexible main spaces of the apartments. Underneath an elevated hallway at the inside wall there are the beds which are hidden during the day. Folding walls divide the living room only during the night into three bedrooms.



1.23 Immeuble Locatif
Elevation, Section, Plan
Two Apartment Types, Plans showing use by night and by day

Two Family House, Weissenhofsiedlung
Stuttgart, 1927
by Le Corbusier

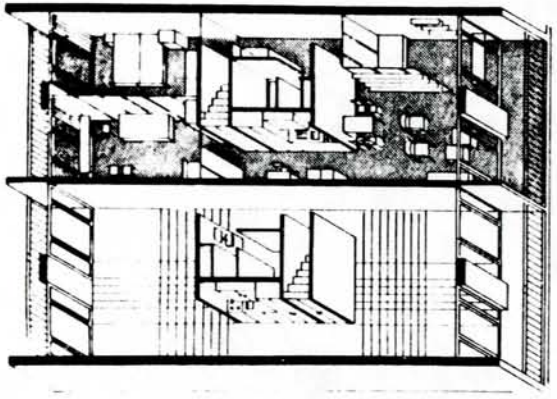
Movable partitions subdivide the long living room into two or three bedrooms during the night. To have individual access to each bedroom, there is a hallway along the back wall.

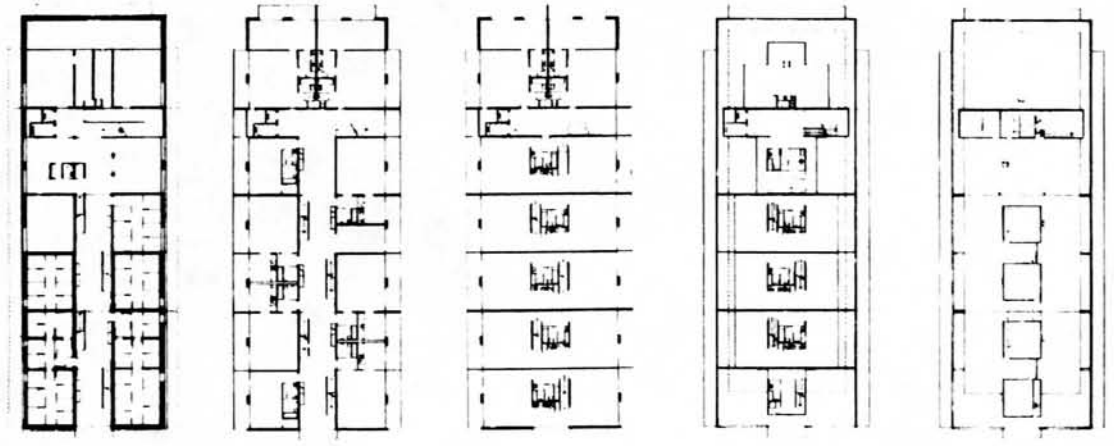


1.24 Two Family House, Weissenhofsiedlung
Floor Plans

Apartment House Neuwil
Wohlen, Switzerland, 1966
by Metron architects

The small "unité" with interior double-loaded corridors every third floor consists of 49 different sized apartments. All have a core with kitchen, bathrooms and stairs, where there are no alterations possible and one or two areas that can be divided into smaller rooms with a special wall system. Extra wall elements are stored in the basement, and can be used for future alterations.

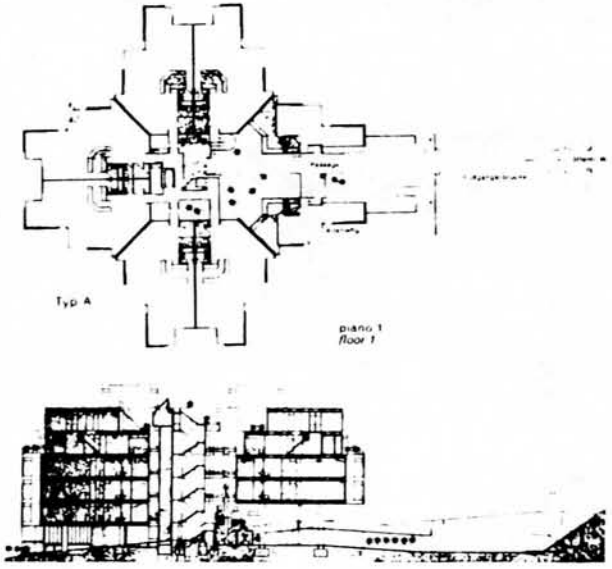


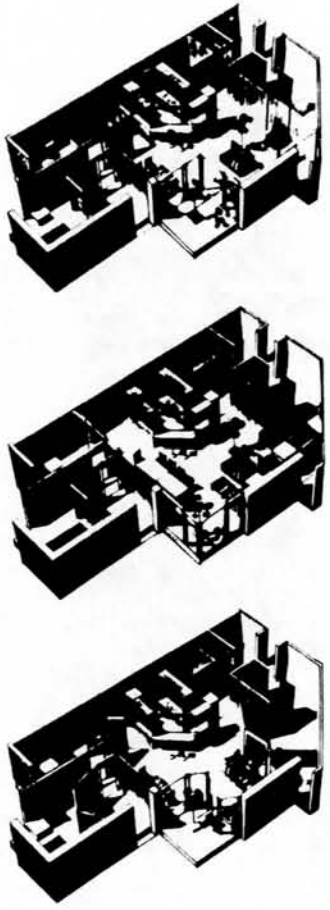


1.25 Apartment House Neuwil
Typical unit, Grid for Partitions
Floor Plans

Habiflex
Wulfen, Germany, 1974
by Richard Gottlob and Horst Klement

Forty different sized apartments are clustered on five floors around a vertical access core. The interior kitchen and the bathrooms of each apartment are completely installed. All other inner walls are movable by the tenants without any specialized assistance. The habitable space is completely alterable in plan. The frontage is adjustable by the positioning of the windows.

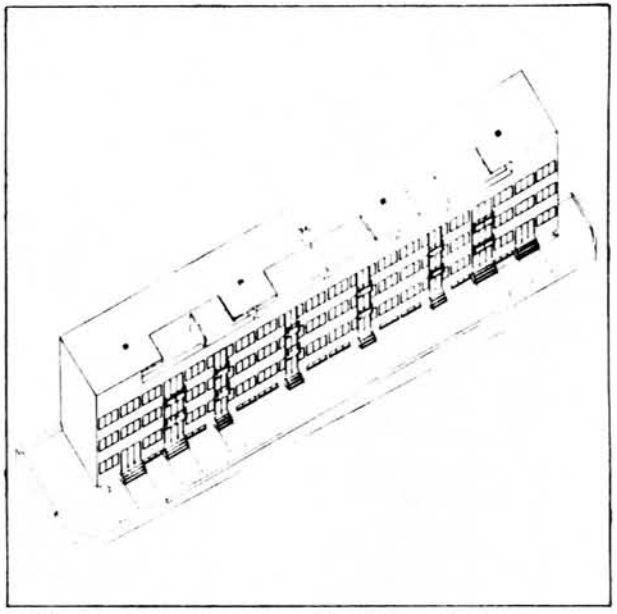




1.26 Habiflex
Typical Floor Plan
Section
Alterations of one Unit

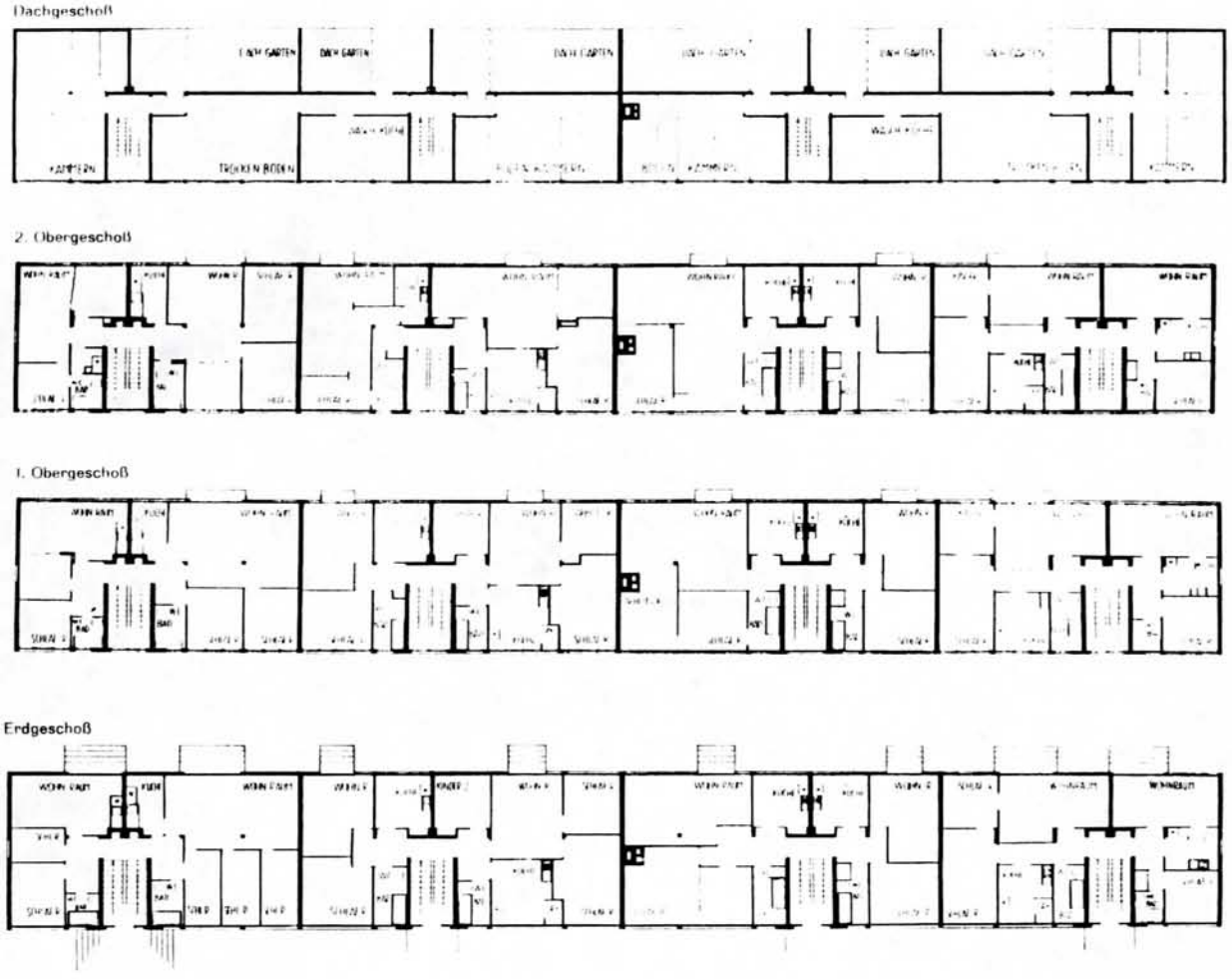
Apartment House, Weissenhofsiedlung
Stuttgart, 1927
by Mies van der Rohe

The four-story building is arranged around four internal sets of stairs that serve two apartments on the first three floors. The top floor is given over to the laundries and terraces. A steel skeletal structure allows the placement of partitions inside the apartments according to individual design.



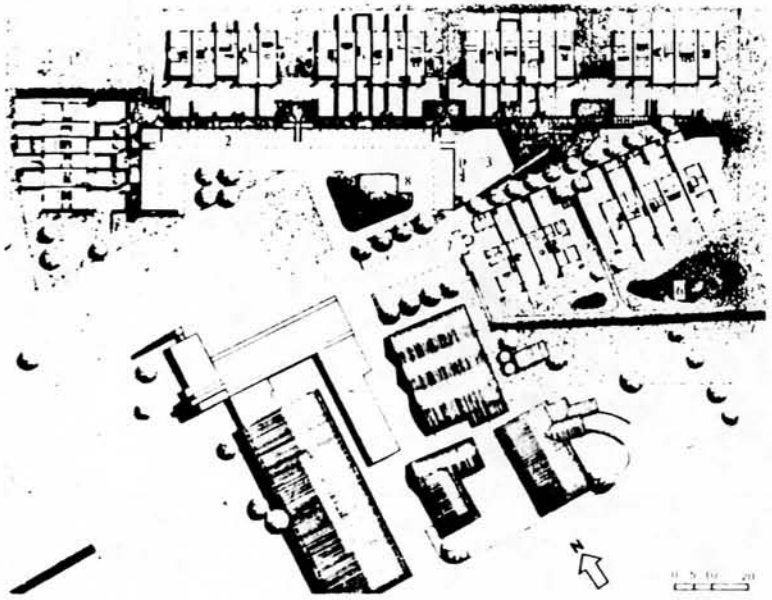
1.27 Apartment House, Weissenhofsiedlung
Axonometric

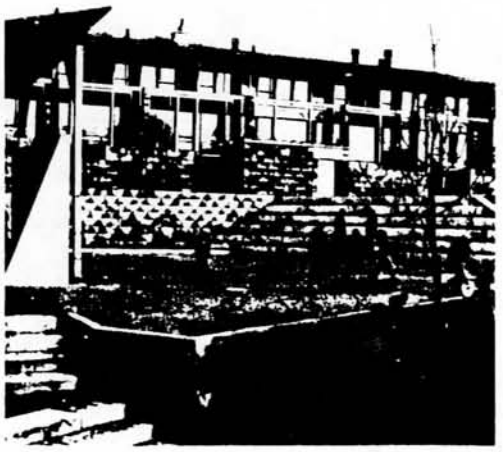
I.28 Apartment House, Weissenhofsiedlung
Floor Plans

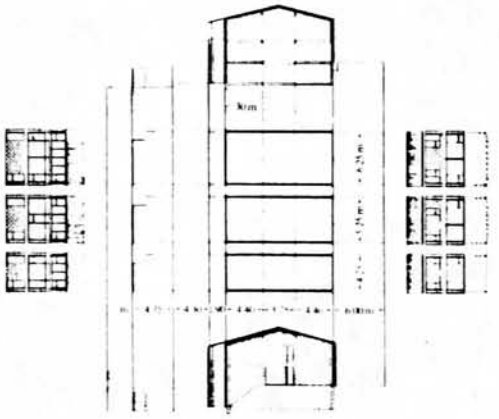


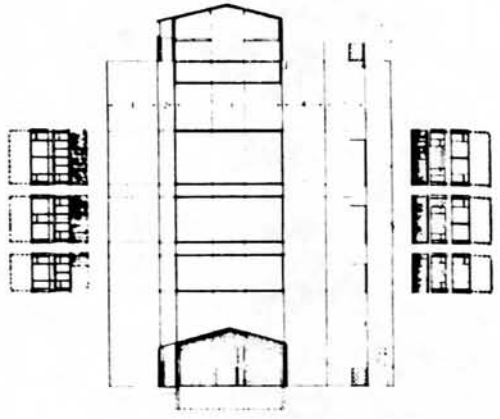
Settlement Bleiche
Worb, Switzerland, 1980-1982
by Franz Oswald

Thirty-seven rowhouses are grouped in seven buildings placed around a court with the common parking and a square with a children's playground. Within identical three-story "shells" made of concrete blocks there are houses with three different widths available. Their interiors can be planned and built in different materials according to individual designs and budgets.





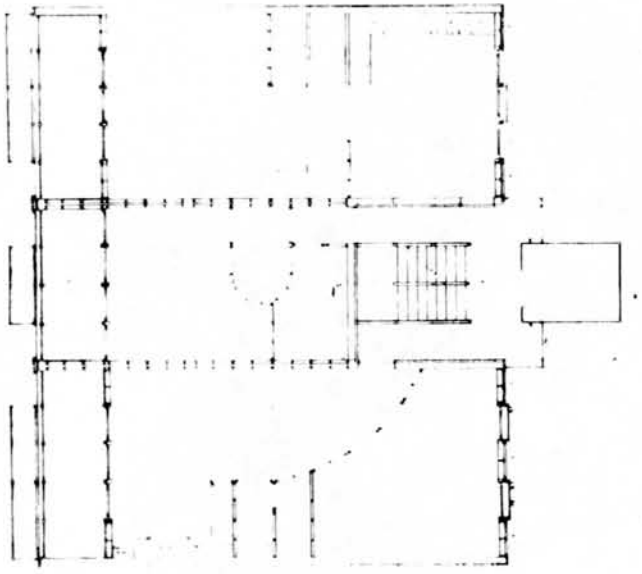




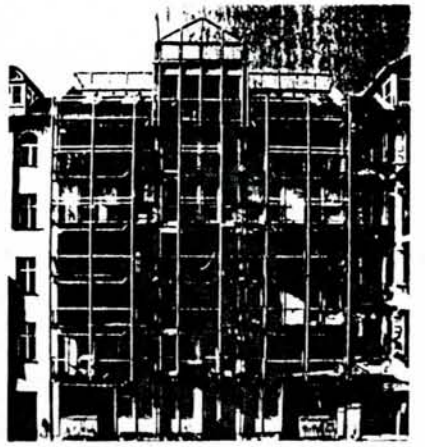
1.29 Settlement Bleiche
Site Plan
Typical Units, "shells"

Wohnregal
Berlin, 1986
by K. Nylund, P. Stuerzebecher and
C. Puttfarken

Twelve duplex apartments sit in a so-called "housing shelf" in a party-wall site. The given main structure is built of precast concrete elements and consists of an access core and slabs every second floor, held up by columns. Within this structure, wood frame facades, interior walls and mezzanine floors can be added by the inhabitants, partially according to their own design.



1.30 Wohnregal
Floor Plan



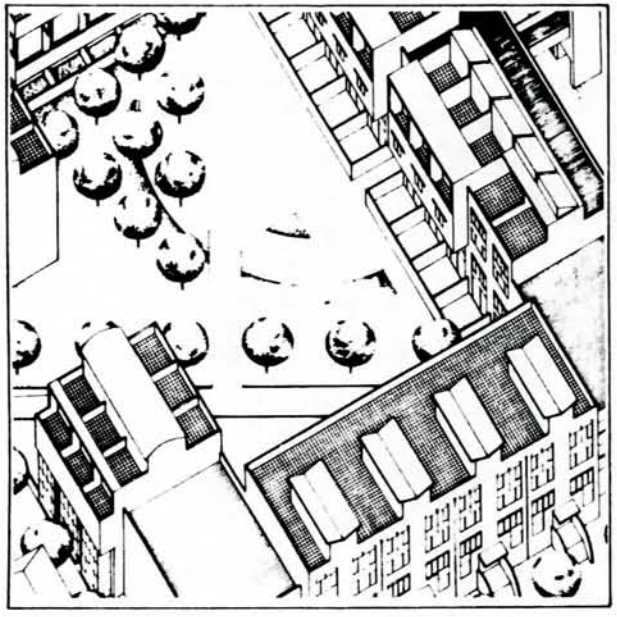
The Street Side Wall of the "Convertible"

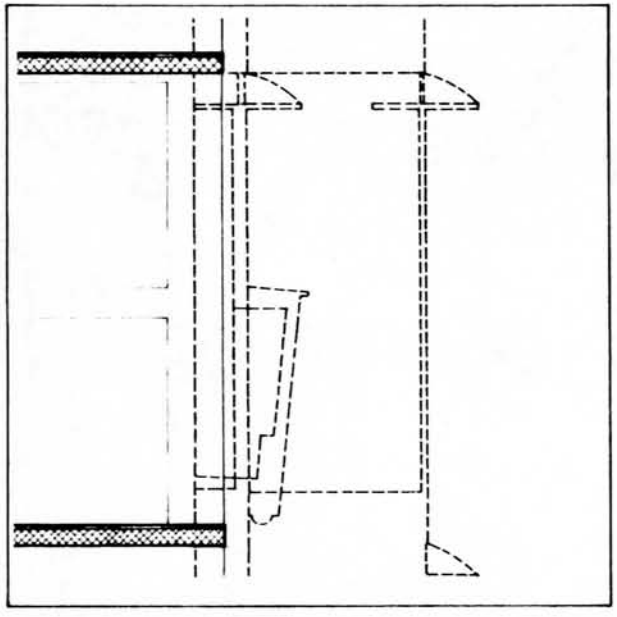
Introduction

The relatively small piece of wall on the street side of the dwelling unit has to satisfy very different demands. Overall, it should be an interesting inside facade for the double-story space; parts of it should work for smaller rooms within the divided volume.

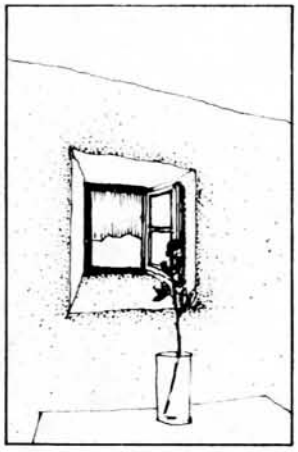
Light, view, ventilation and possibly exits have to be provided. Shades and movable insulation aid climate control. To optimize variability for additional floors and partitions within the volume, the inside walls should be free of installations. Heating and cooling elements have to go in the outside wall.

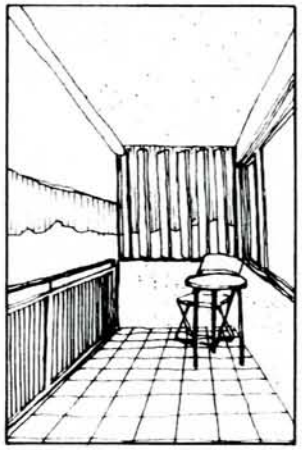
The goal of this study is to put together a catalog of necessary and possible single solutions. Different combinations will be shown in a series of plans, sections, elevations and axonometrics.

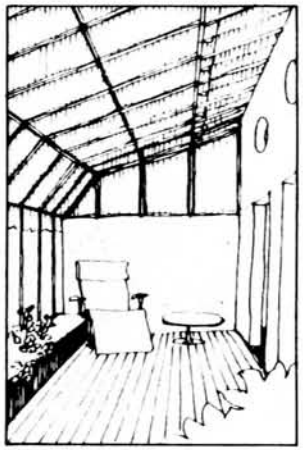




Catalog of Single Solutions

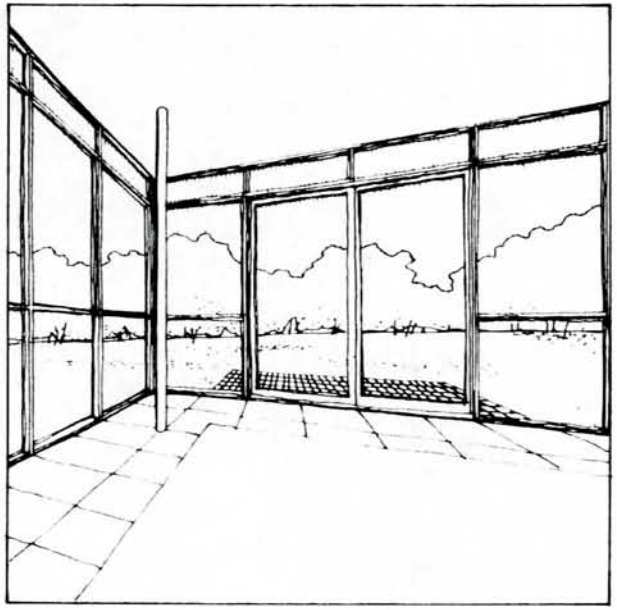


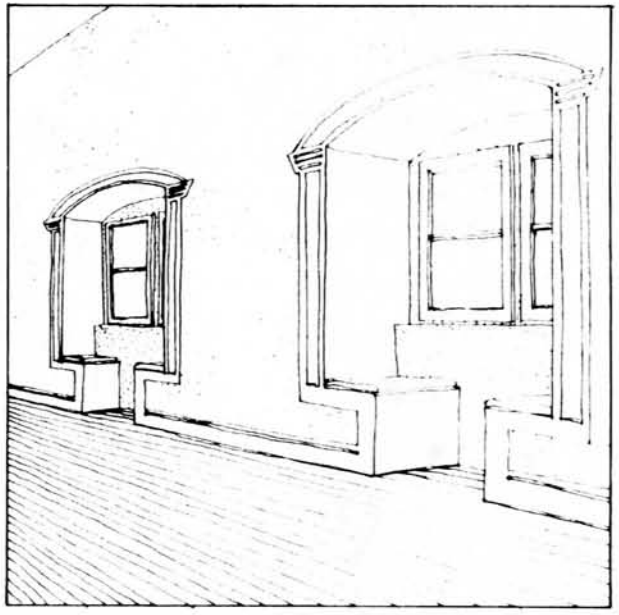




Inside-outside

Simple windows sitting within the plane of the wall, bay windows projecting out into the open space, green houses and balconies are basic reactions to control the inside-outside interaction. They will determine how the private inside and the public outside relate to each other, how the rooms next to the wall can be used and whether or not there is a zone in front of the building to be used privately.



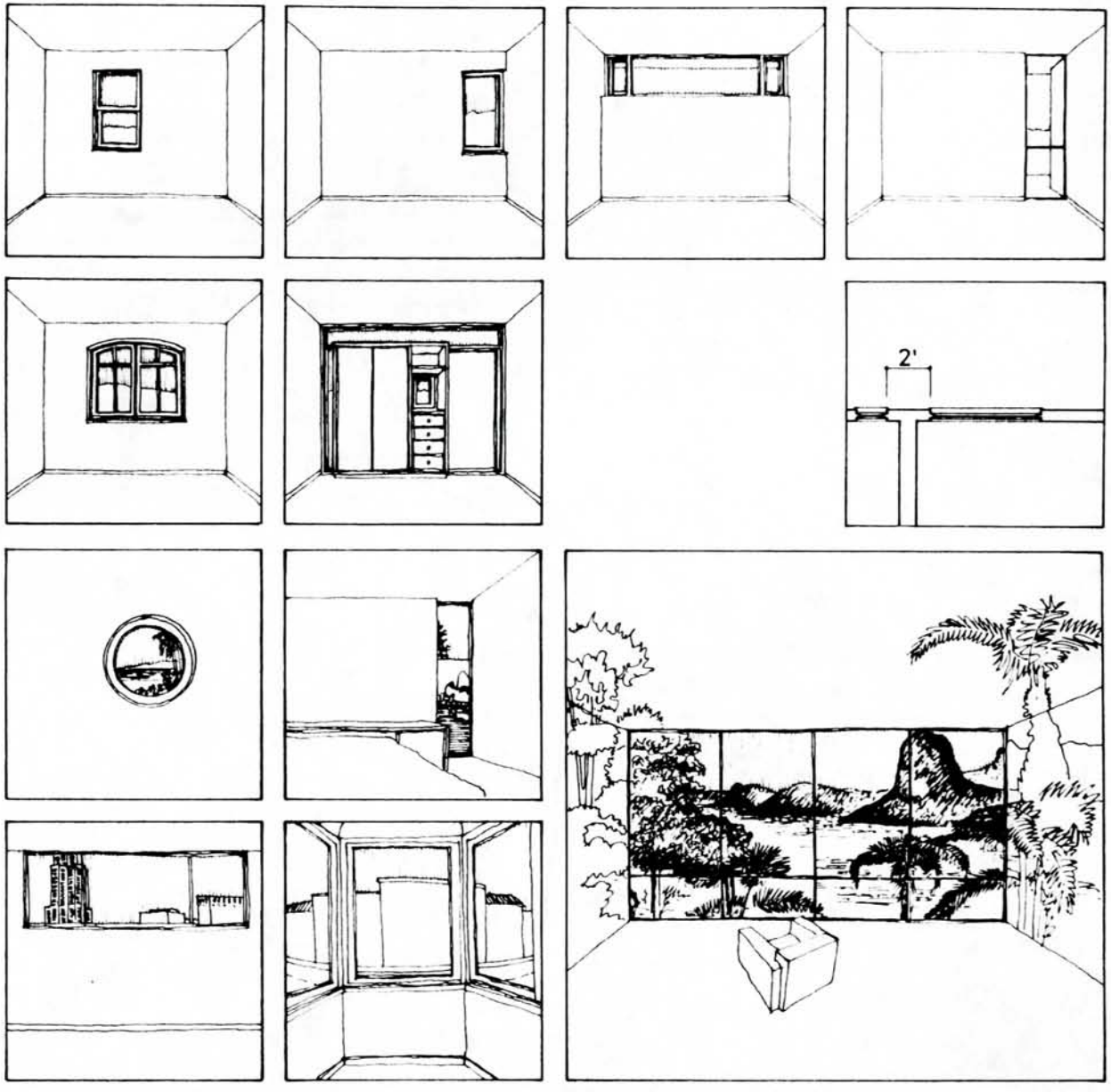


Wall

Different relationships between inside and outside can be established in varying the wall system. A thin membrane made of mostly glass fosters a direct relationship while heavy, thick walls with punched windows will make clear separation. With many design reactions, the wall can be made habitable. Depending on how it is made, the niches in the thick wall can become part of the inside or the outside space.

Openings

Openings can sit within the wall, at corners or between the planes. The opening can consist of one window or contain a frame for differently treated panels. As each apartment has its own fire walls, a minimum separation of two feet between openings for different units is required.

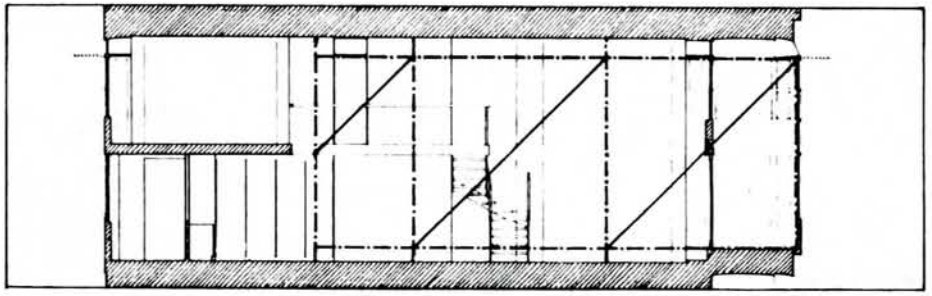


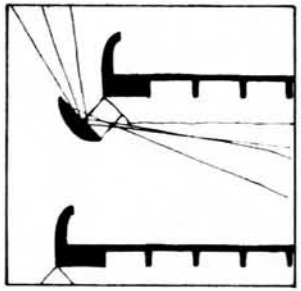
View

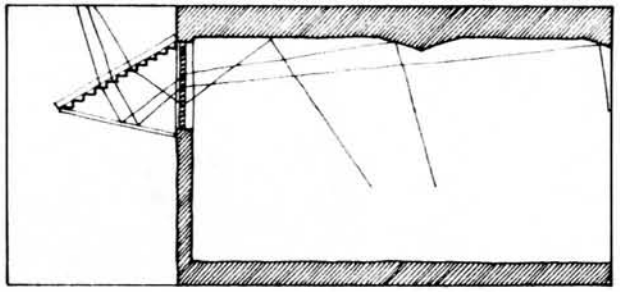
There are many possibilities for the window design to control the view. With a punched window, the view can be framed so that it is seen as a painting on the wall. A long, narrow opening will give only a hint of what lies beyond the room.
A horizontal band window might restrict the view upward and focus on the skyline. A bay window allows views into the outdoor space parallel to the outside wall. A window wall permits, with its great vista, a direct inside-outside relationship.

Light

To maintain a minimum level of illumination and an even distribution of daylight, the depth of a room should not exceed 2 to 2½ times the height of the window wall. The double-story space of the "convertible", without additional galleries, will have enough natural light. To have sufficient daylight when the space is divided, special fenestration should reflect zenithal light onto the ceiling.





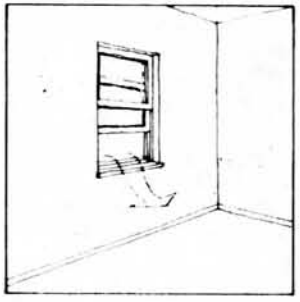


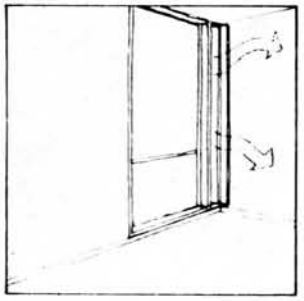
TVA Office Building,
Chattanooga, Tennessee

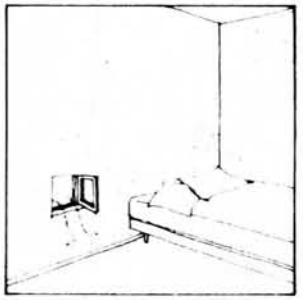
Vaucher Sports Goods Shop,
near Berne, Switzerland

Ventilation

Simple, operable windows and doors and floor to ceiling ventilation slots on both sides of the apartment can allow through ventilation. Small windows about two feet above the floor can provide fresh air in the bedrooms. In noisy or polluted sites, mechanical ventilation with filters may be necessary.





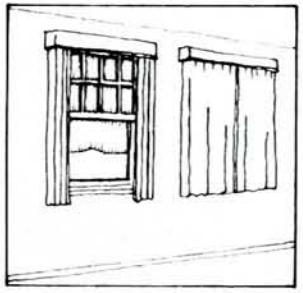


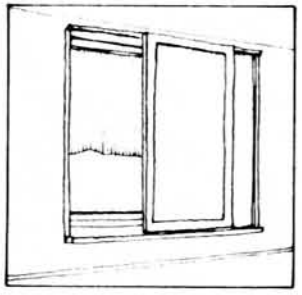
Movable Insulation

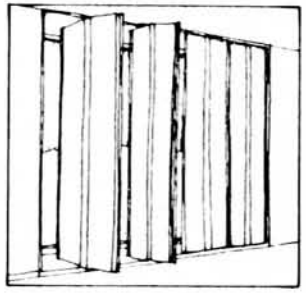
To cut down the heat loss at night, movable insulation can be placed over the windows. They can be installed inside, outside, or within the plane of the glazing. They may consist of large, rigid panels or flexible coverings made of small, rigid pieces or membranes.

inside

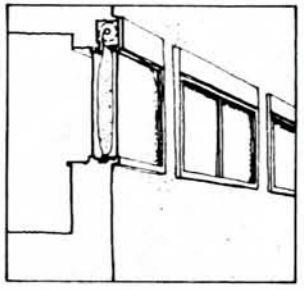
curtains
sliding panels
louvers







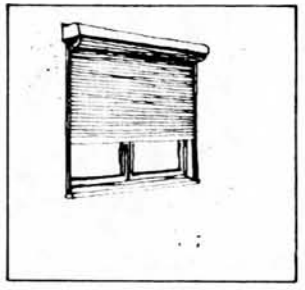
within the plane

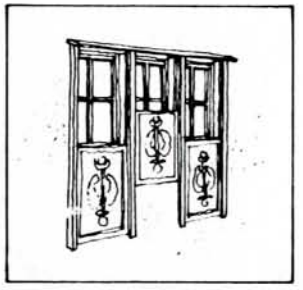


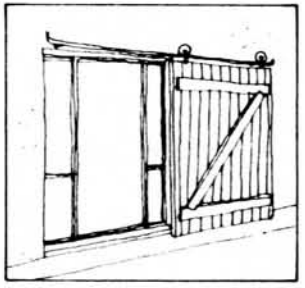
self-inflating curtain

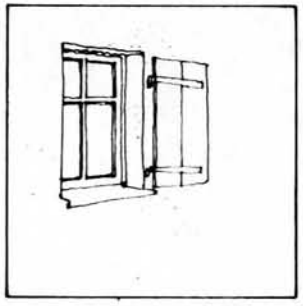
outside

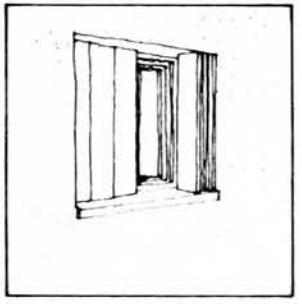
blinds
sliding shutters
folding shutters

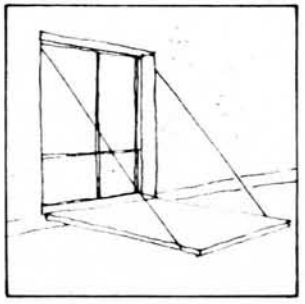






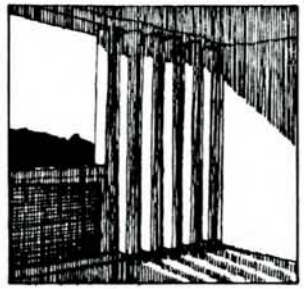
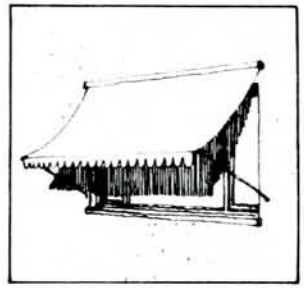
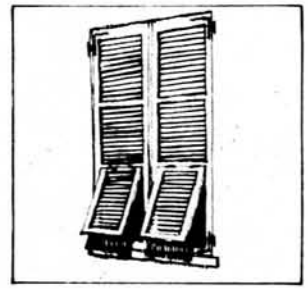
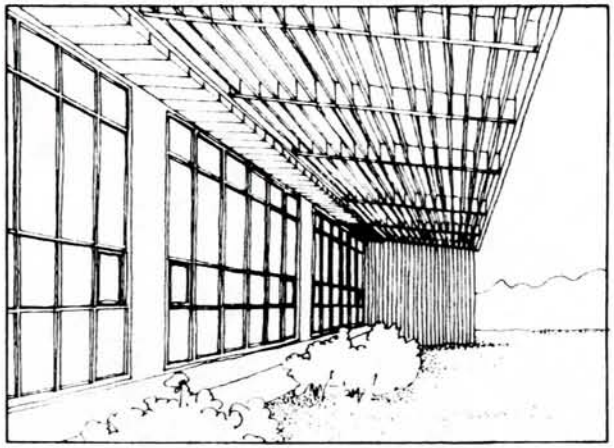
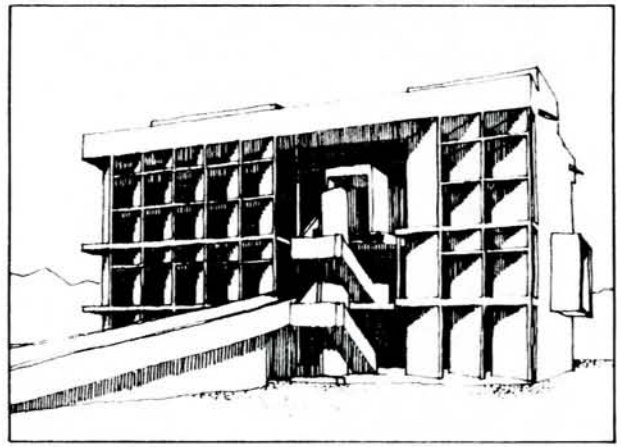






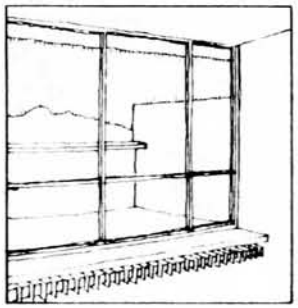
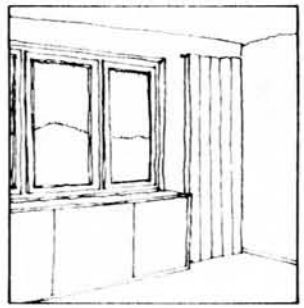
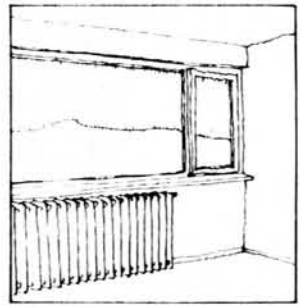
Shading

To prevent the apartment from overheating, permanent or movable shading devices can be mounted inside, outside, or within the plane of glazing.

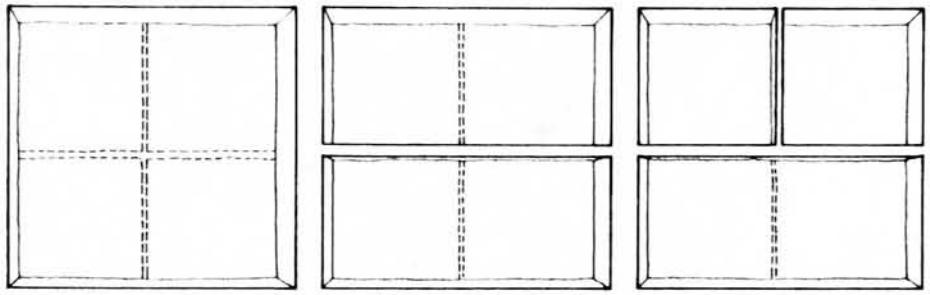
Heating

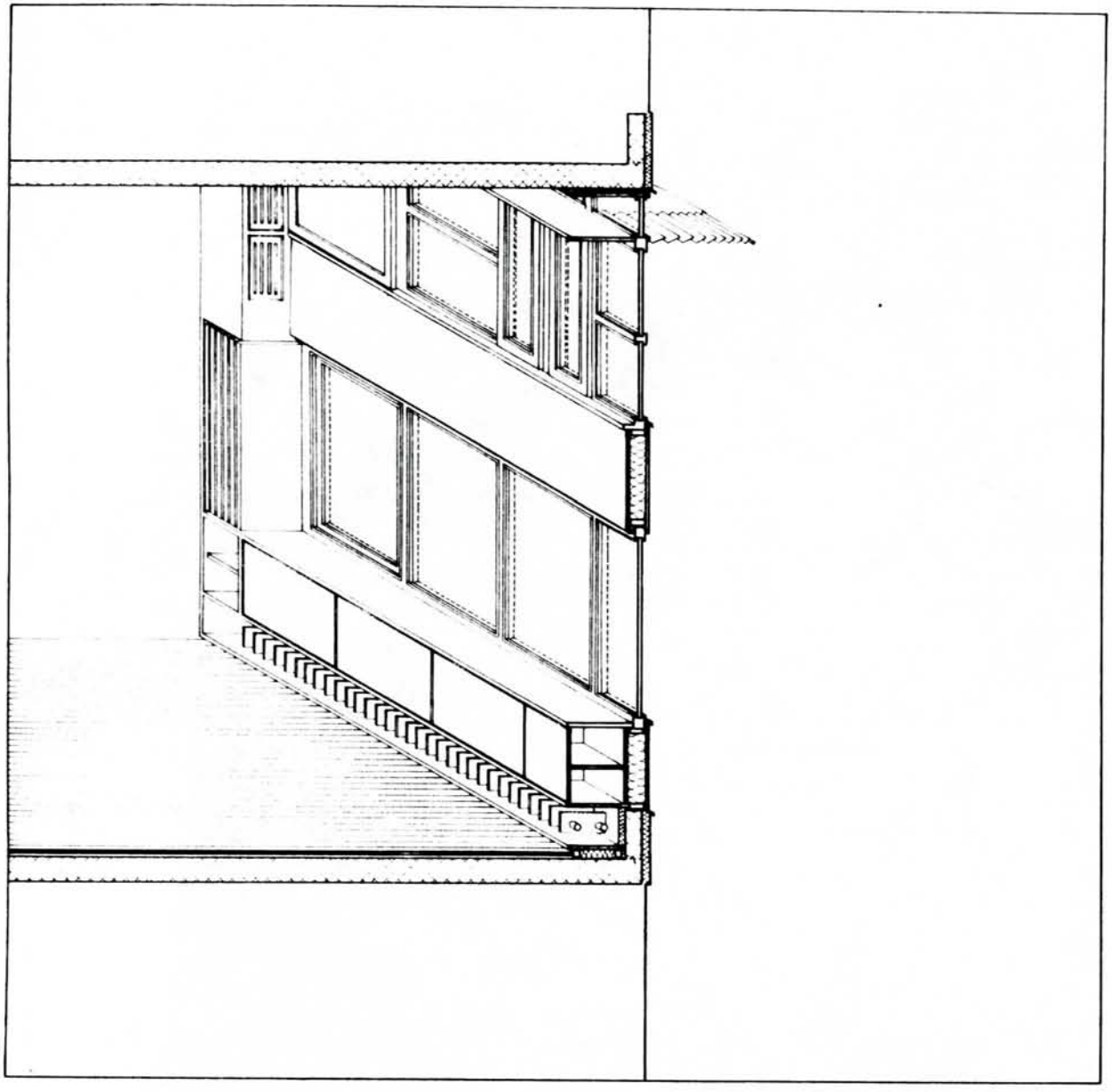
Hot water radiators placed in the outside wall provide even heat distribution. Linear elements can be placed horizontally or vertically. Concentrated radiators may be located underneath a band window.

Divisions

Restrictions for the design of the outside wall will be a result of opportunities to divide the double-story space into smaller rooms.



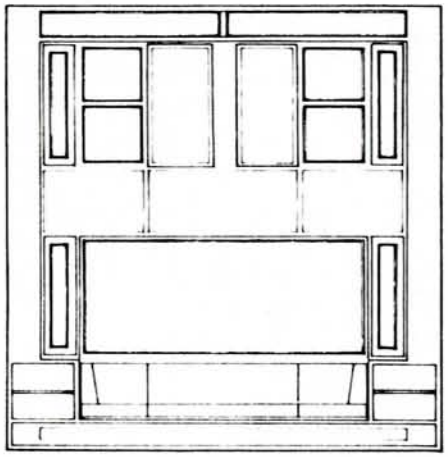


Combinations

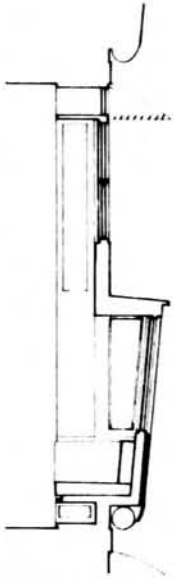
All four design proposals have a zenithal light fenestration underneath the ceiling, horizontal radiators on the lower level, and vertical ones on the upper level in common. Symmetrically placed punched windows with sideways, sliding, interior insulation panels and operable ventilation windows next to them on the upper level are repeated in all proposals. The significant difference between the four solutions is found on the lower level.

Flat Wall

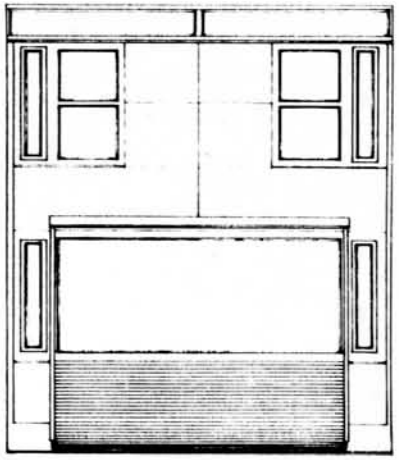
A band window with folding interior insulation panels sits on top of a series of built-in cabinets and open shelves.



inside elevation



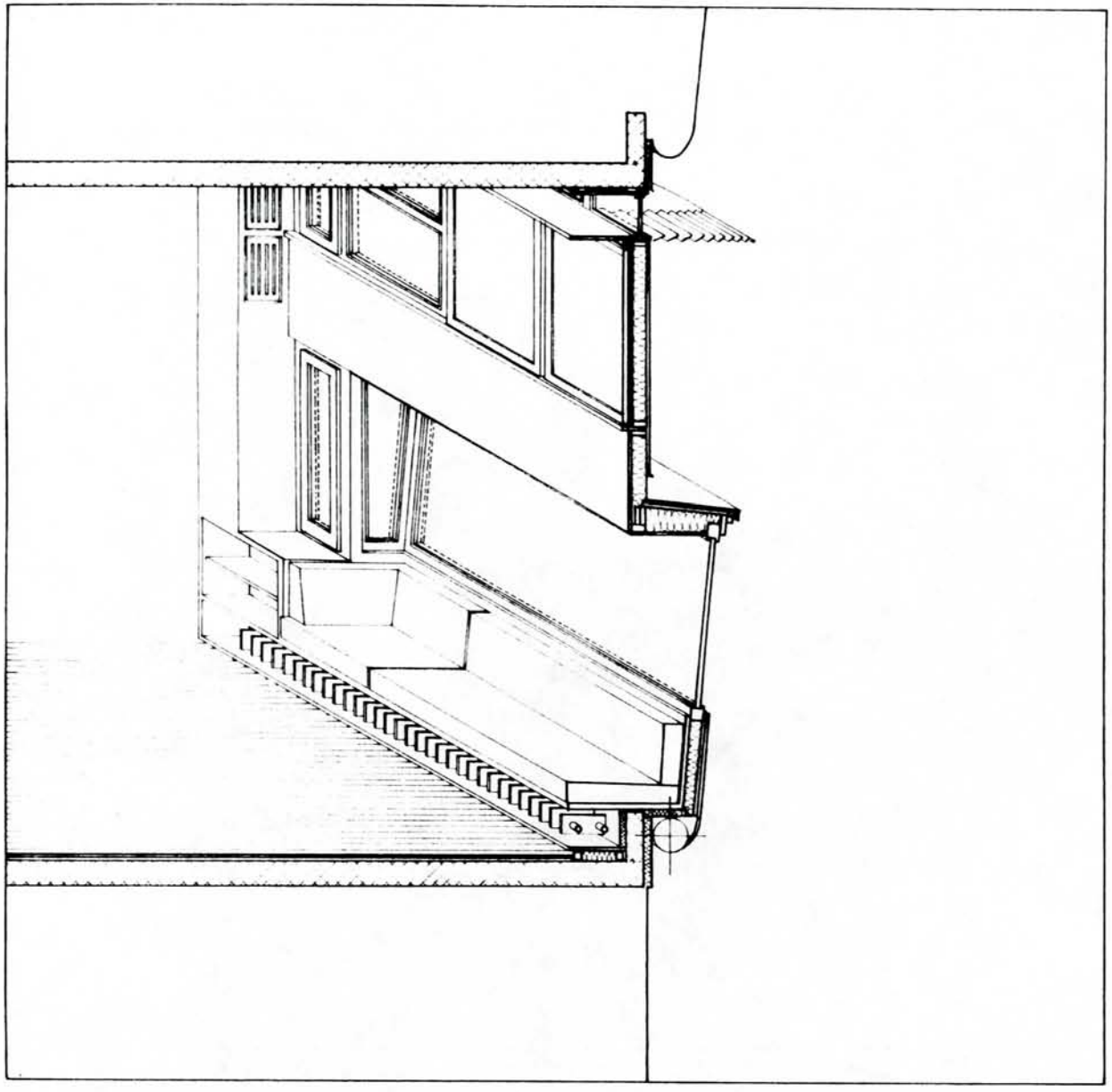
section



outside elevation

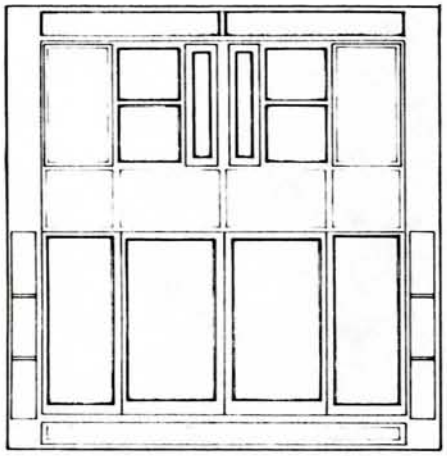
lower level plan

upper level plan

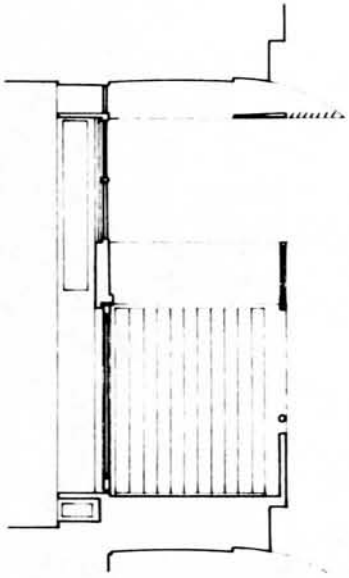


Bay Window

Small operable windows flank a bay window with an exterior rolling insulation shutter. Open shelves and a couch are built-in underneath.



inside elevation



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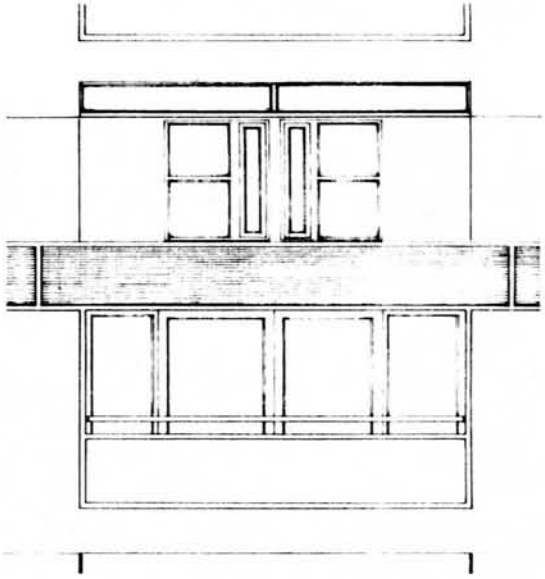
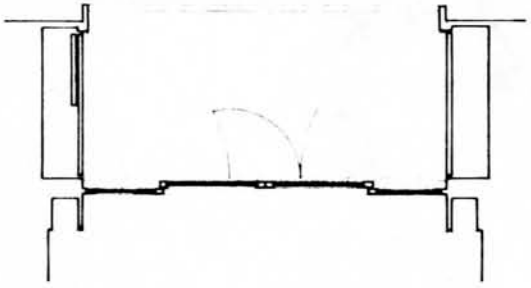
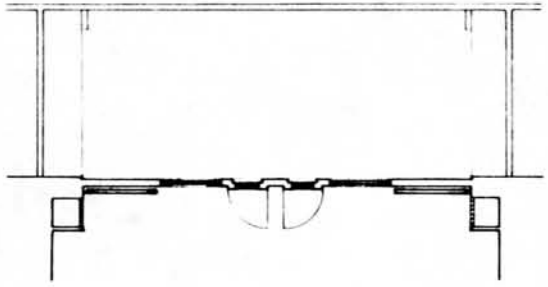


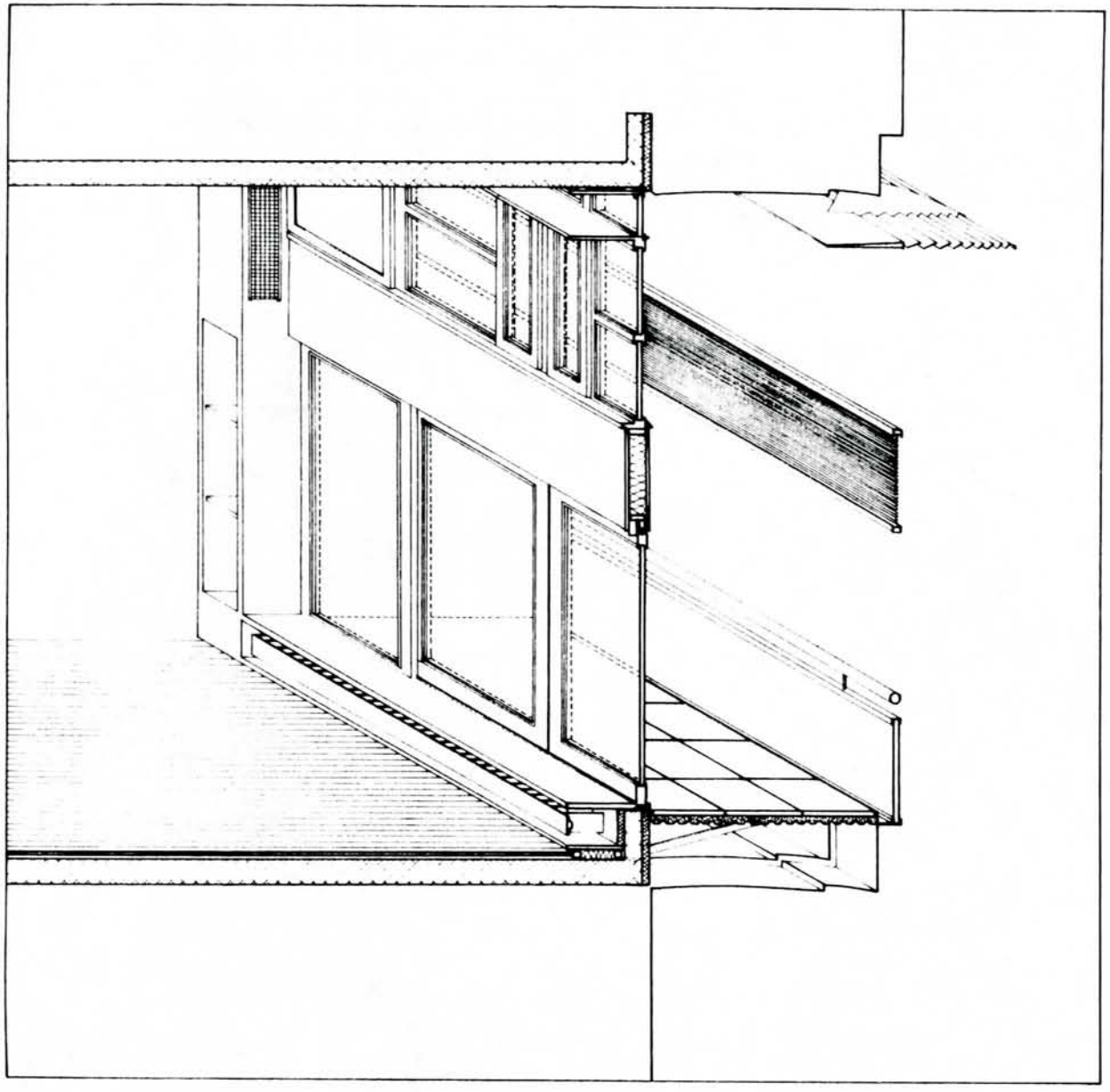
outside elevation



lower level plan

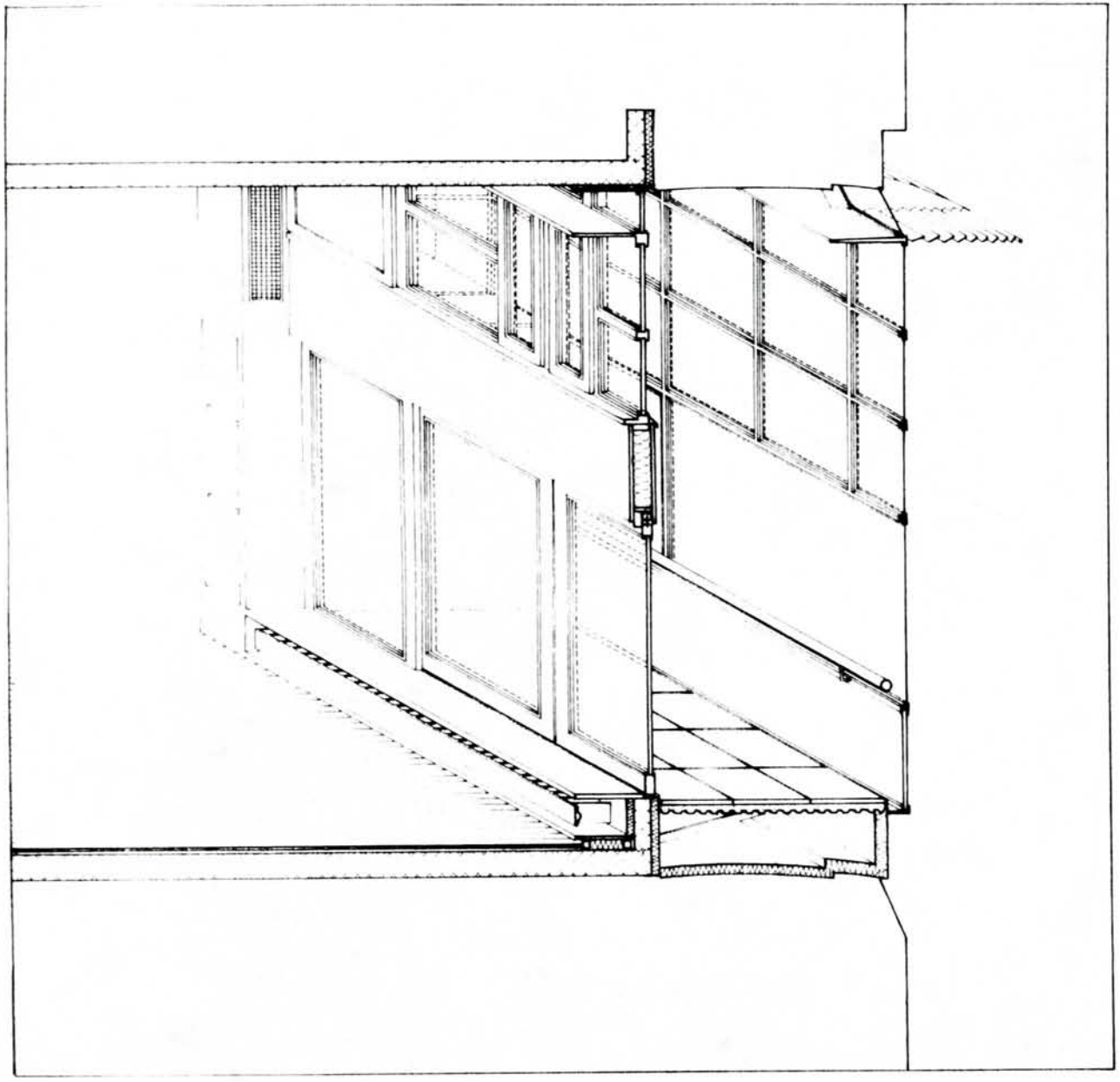


upper level plan



Balcony

Built-in book shelves flank a double, sliding door with exterior insulated blinds.



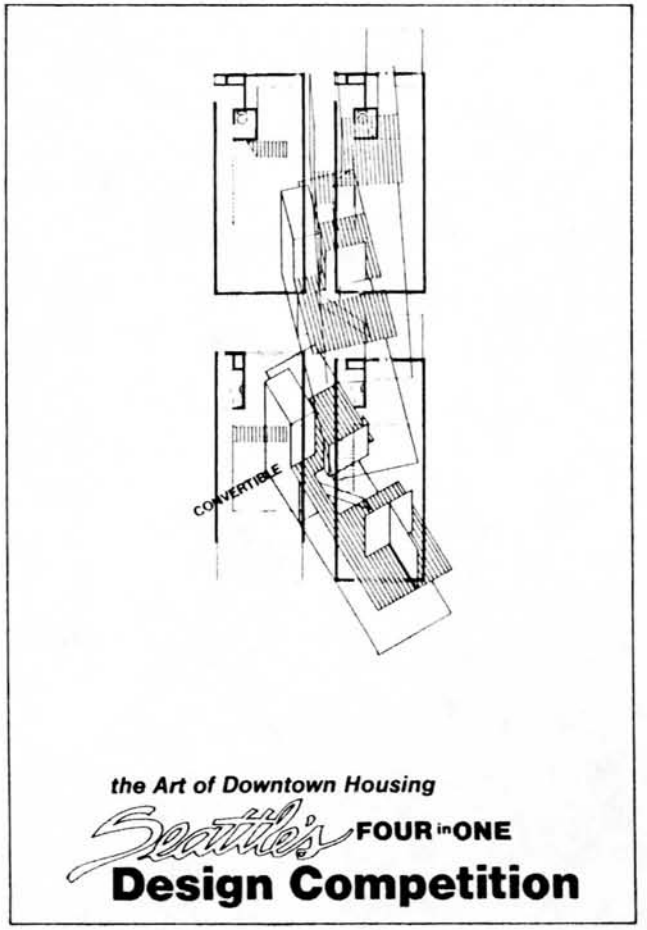
Green House

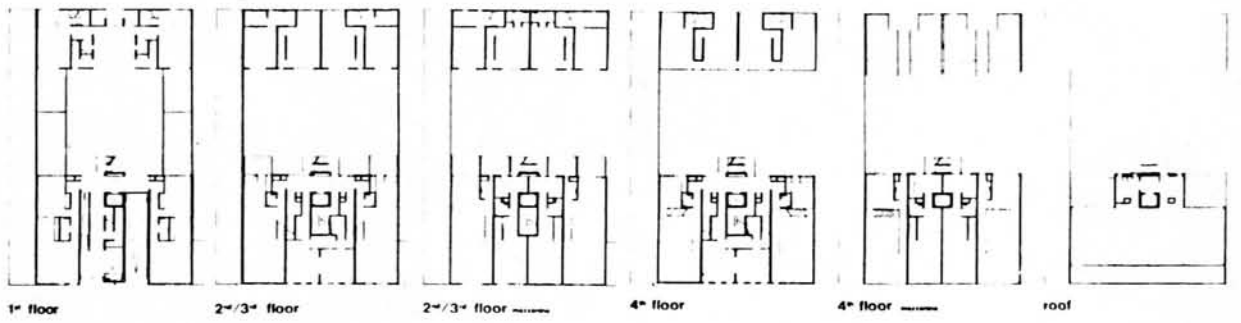
Built-in book shelves flank a double, sliding door with exterior insulated blinds.

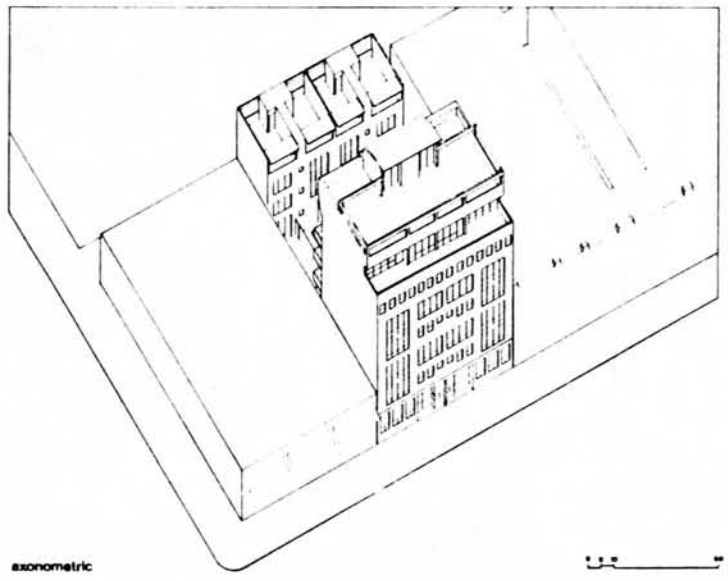
Seattle Downtown Housing Competition

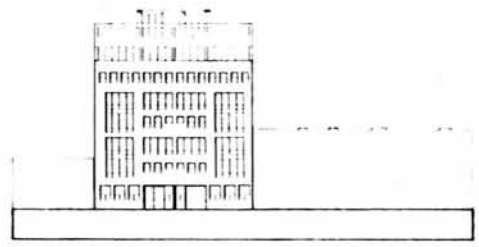
Introduction

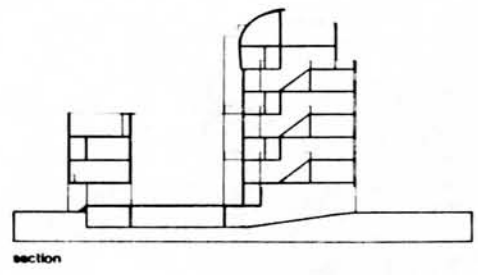
In the "Seattle's Four in One Design Competition, 1988", I got the opportunity to test the "convertible" in real sites. I entered proposals for a single lot infill, for a linear row, and for a cross block.

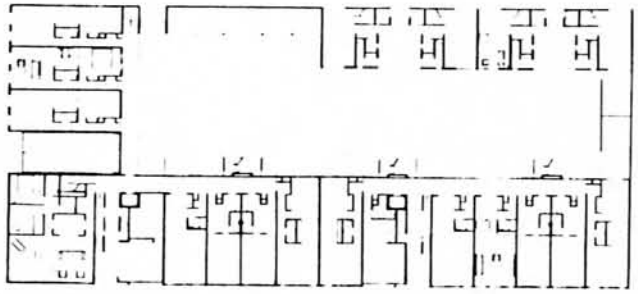


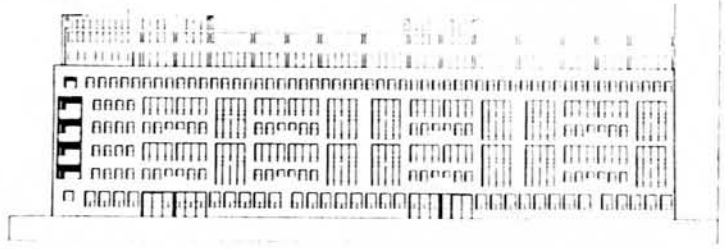

1st floor
2nd/3rd floor
2nd/3rd floor
4th floor
4th floor
roof

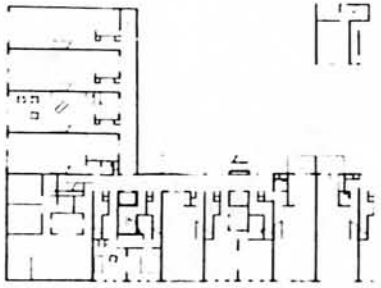

axonometric

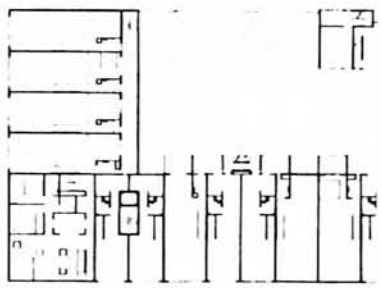

elevation

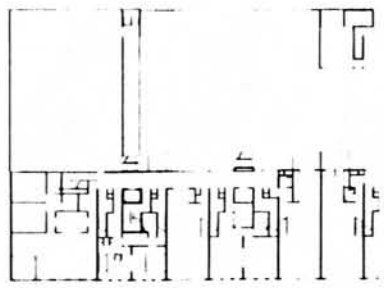

section

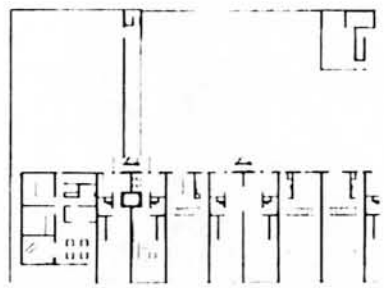

1st floor

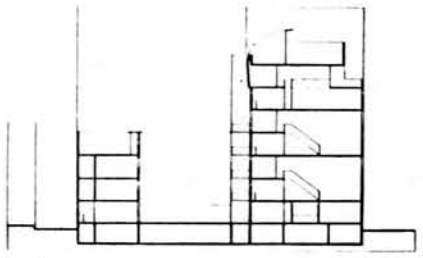

elevation


2nd/3rd floor


2nd/3rd floor

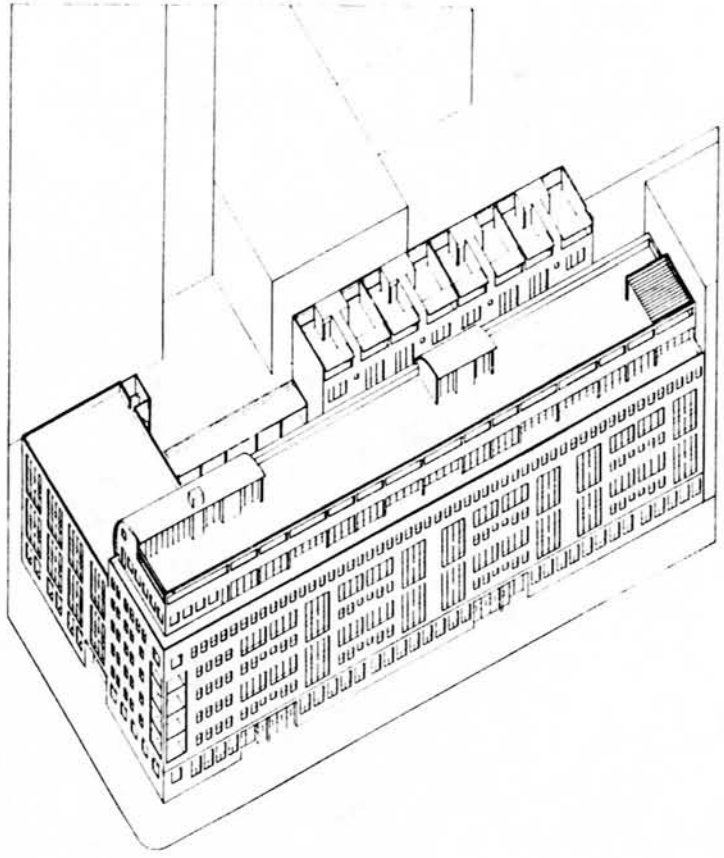

4th floor


4th floor

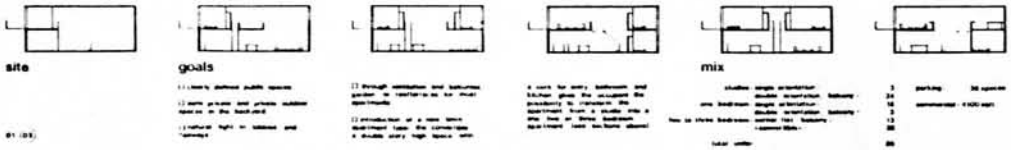


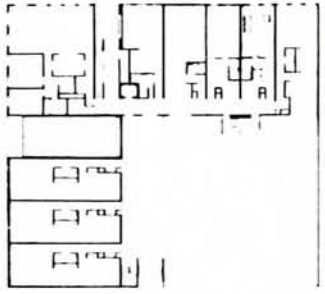
section

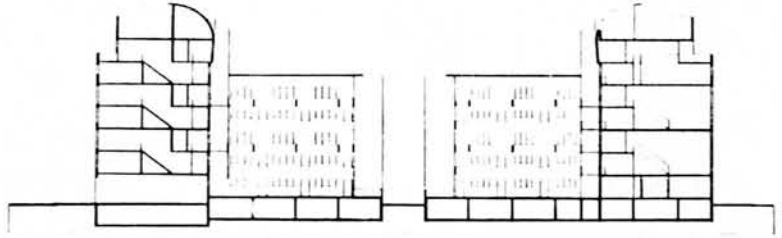
roof

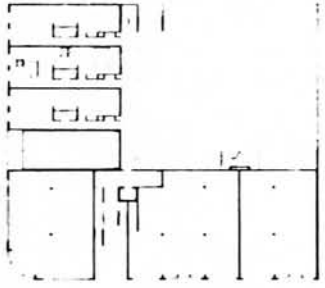


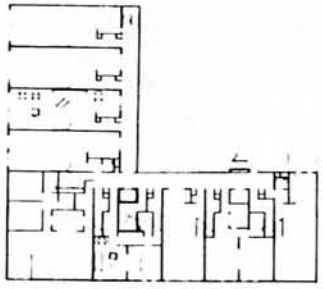
axonometric


site
goals
mix

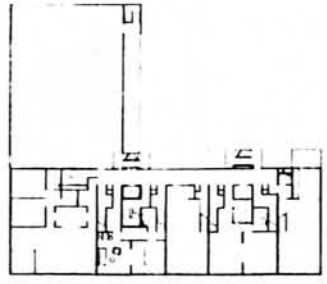


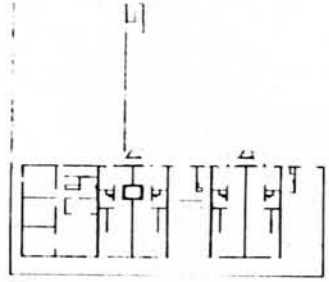

section

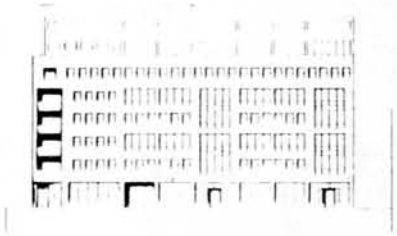

1st floor


2nd/3rd floor


2nd/3rd floor

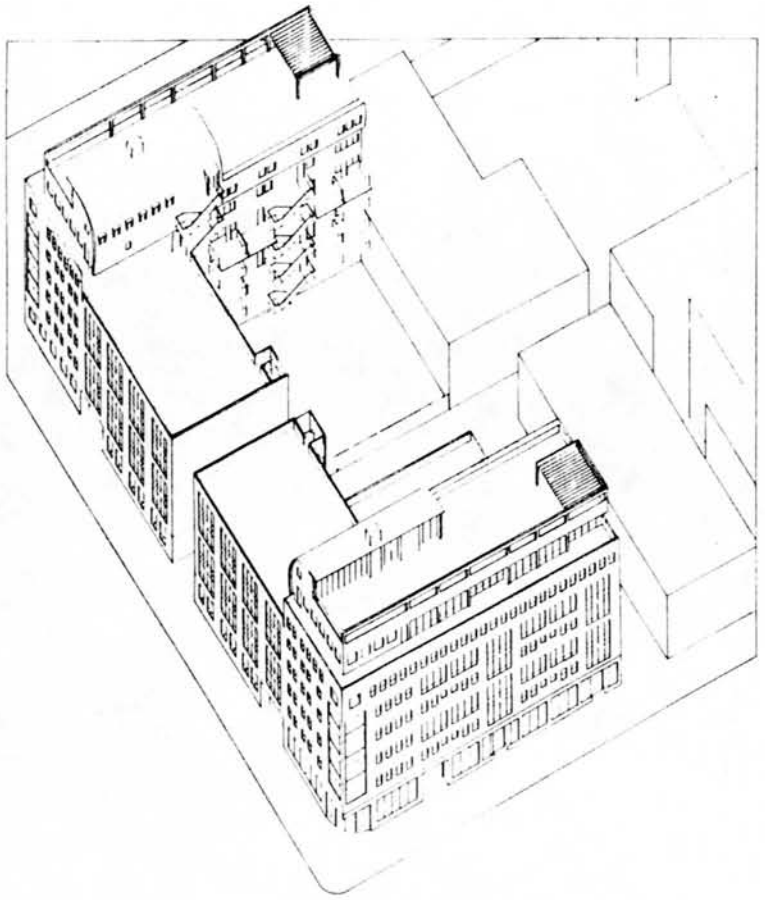

4th floor


4th floor



elevation

roof



axonometric

Illustration Credits

Leonardo Benevolo:
Die Geschichte der Stadt
Campus Verlag, Hamburg, 1983

0.1, 1.1, 1.3, 1.8. 1.10, 1.13, 1.15

Roger Sherwood:
Modern Housing Prototypes
Harvard University Press, Cambridge, 1978

0.2, 0.3, 0.4, 0.5, 1.2, 1.4, 1.5, 1.11, 1.19, 1.20

Hubert Hoffmann:
Row Houses and Cluster Houses
Frederick A. Prager, New York, 1981

1.7

Kress and Rietdorf:
Wohnen in Staedten
VEB, Berlin, 1972

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Le Corbusier:
Oeuvre complète, Volume 1, 1910-1929
D. Stonorov and W. Boesinger, Zurich, 1929

1.16, 1.17, 1.23

Le Corbusier:
Oeuvre complète, Volume 4, 1938-1946
W. Boesinger, Zurich, 1946

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Juergen Joedicke:
Die Weissenhofsiedlung
Kramer Verlag, Stuttgart, 1977

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Internationale Bauaustellung Berlin, 1987
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1.30

LOTUS international, 10
Milan and New York, 1975

1.9, 1.21, 1.22, 1.26

WERK, 2/1966

1.25

WERK, BAUEN UND WOHNEN, 4/1984

1.29

WERK - Archithese, 21-22/1978

1.6

Precedents of the "Convertible"

A Brief Survey on Typical Dwelling Units, Apartment Buildings, and Experimental Dwelling.

by
Werner Hofmann
Dipl. Arch. ETHZ

Independent Study

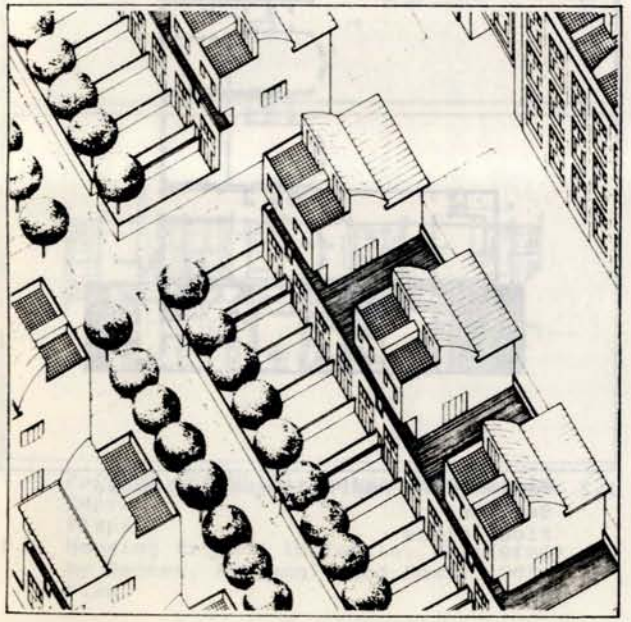
In the School of Architecture
at Syracuse University,
Syracuse, New York.

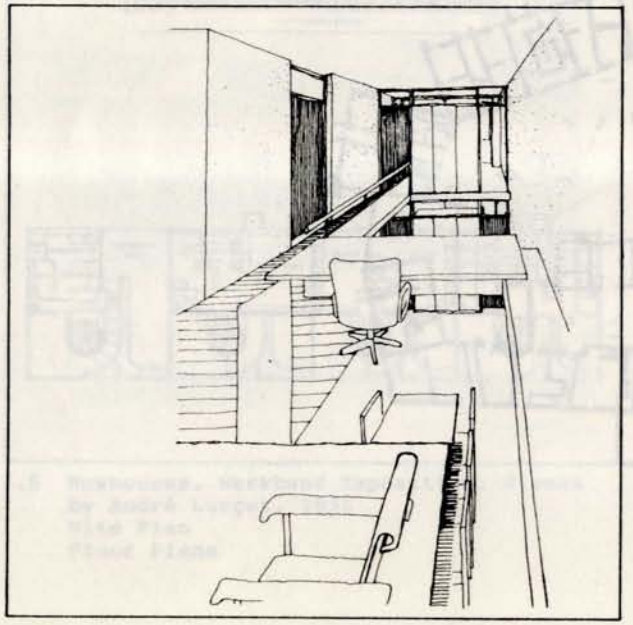
November 1988

Precedents of the "Convertible"

Introduction

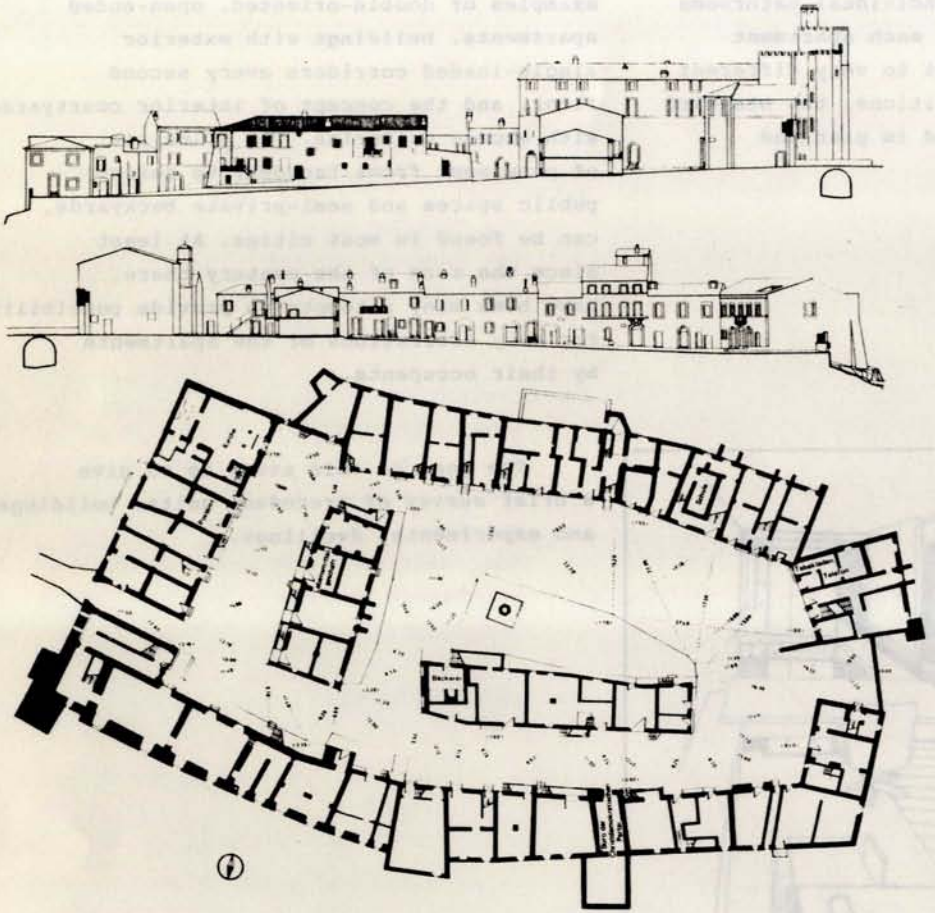
In my thesis "Light, Air, and Space within the 'Urban Poché'" I am proposing an unconventional apartment type as a possible solution for dense, high quality city housing. A simple, double-story volume spans from the street side to the garden side of an apartment house at the edge of a city block. The entrance to the apartment is from an exterior single-loaded corridor on the garden side. Inside the volume, the basic installations (electricity, gas, heating, water, sewage and ventilation) and a gallery above the entrance are given. Other than that, the occupants can complete or alter the apartment according to their individual design. Additional galleries, partitions, different stairs and individual bathrooms and kitchens will make each apartment a special one. To react to very different sites and context conditions, the standard apartment can be varied in plan and in section.



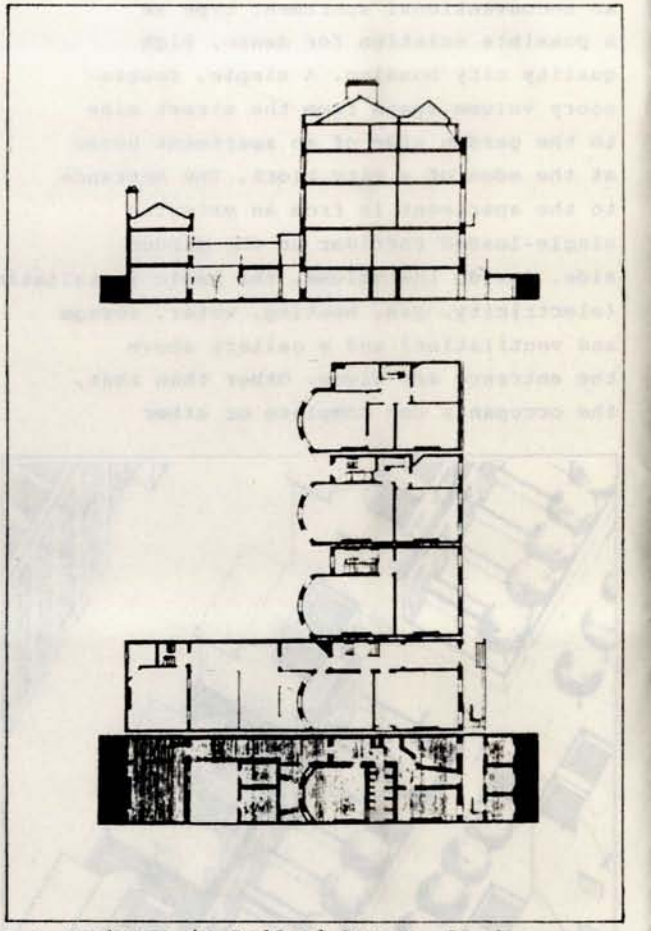


The basic ideas of this dwelling unit type, are already existing. We can find examples of double-oriented, open-ended apartments, buildings with exterior single-loaded corridors every second floor, and the concept of interior courtyards with access galleries. The principle of prominent front facades; to define public spaces and semi-private backyards, can be found in most cities. At least since the turn of the century there have been many attempts to provide possibilities for easy alterations of the apartments by their occupants.

The goal of this study is to give a brief survey of precedent units, buildings and experimental dwellings.

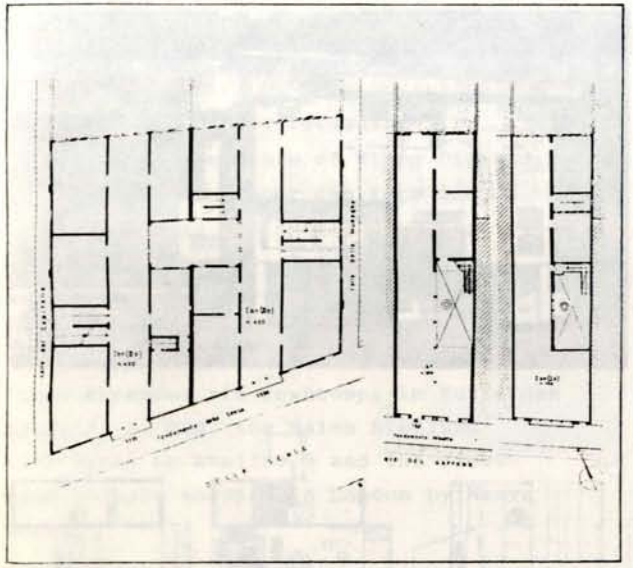


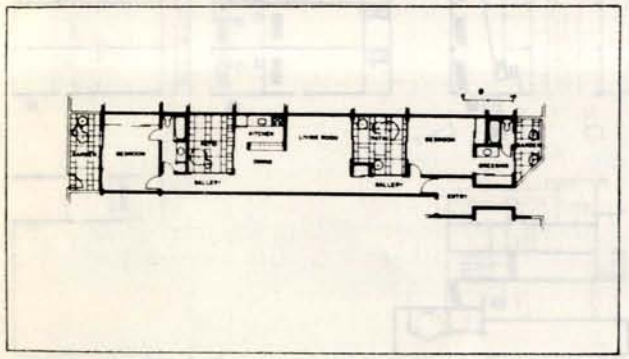
1.1 San Vittorino near Rome
Sections
Plan



1.2 Rowhouse in Bedford Square, London
Section
Floor Plans

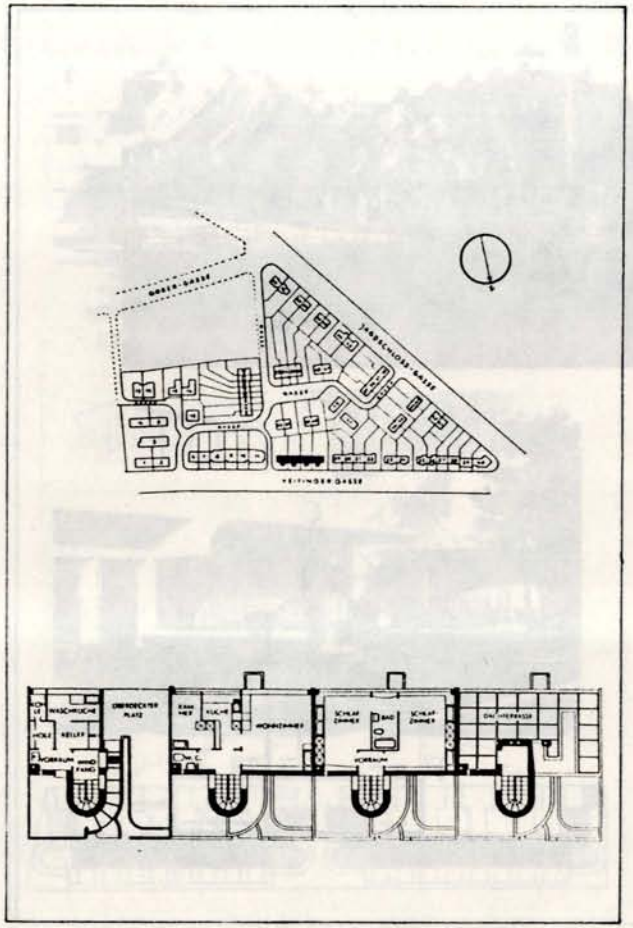
Units





1.3 Palazzi and Multi-Story Rowhouses in Venice
Plans

1.4 Housing Project in Tustin, California
by Backen, Arrigoni, and Ross, 1969
Plan

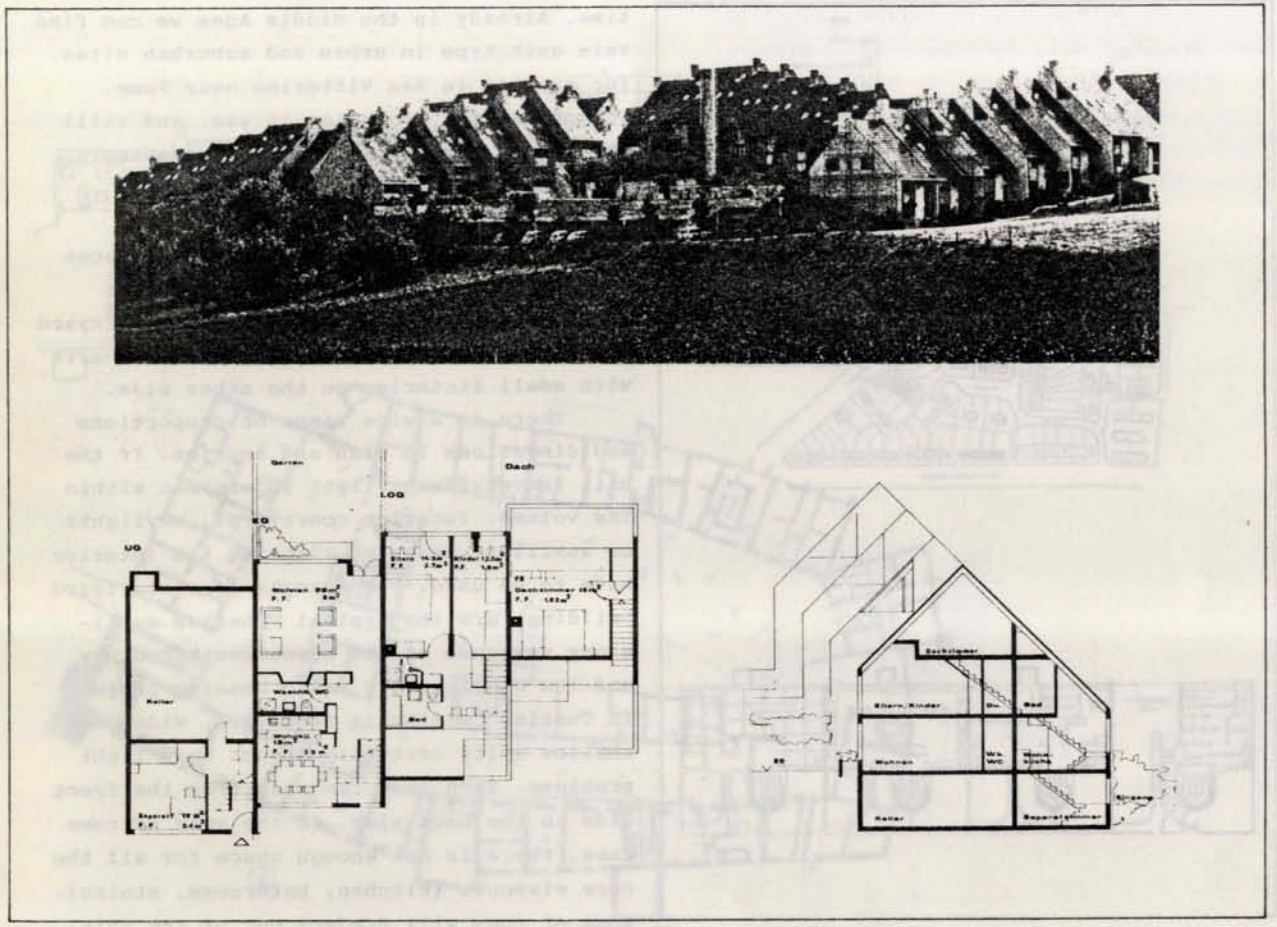


1.5 Rowhouses, Werkbund Exposition, Vienna
by André Lurçat, 1932
Site Plan
Floor Plans

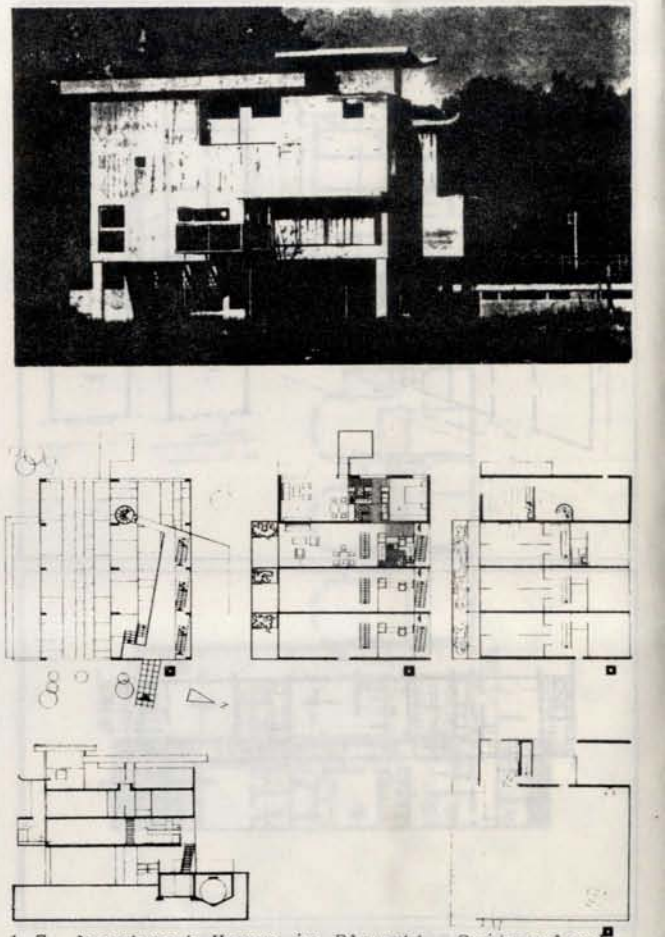
The origins of the double-oriented unit type I am working with, reach far back in time. Already in the Middle Ages we can find this unit type in urban and suburban sites, for example in San Vittorino near Rome. Throughout the centuries it was, and still is, a very popular unit type. For example, there are the nineteen century London rowhouses in Bedford Square.

The typical units require open spaces at each end. Most of them face a public street or square and have a private backyard with gardens, stables, outhouses, or courts with small factories on the other side.

There is a wide range of proportions and dimensions in plan and section. If the unit is very deep, light is minimal within the volume. Interior courtyards, skylights or auxiliary means of lighting the interior have to be used. Two examples for courtyard buildings are the typical Venetian multi-story rowhouse of the seventeenth century and the single-story patio housing project in Tustin, California from 1969. Wide, but shallow units certainly do not have light problems. Each room can span from the front side to the back side. In the very extreme case, there is not enough space for all the core elements (kitchen, bathrooms, stairs); some of them will project out of the main volume, as can be seen for instance in Lurçat's rowhouses at the Vienna Werkbund Expposition.

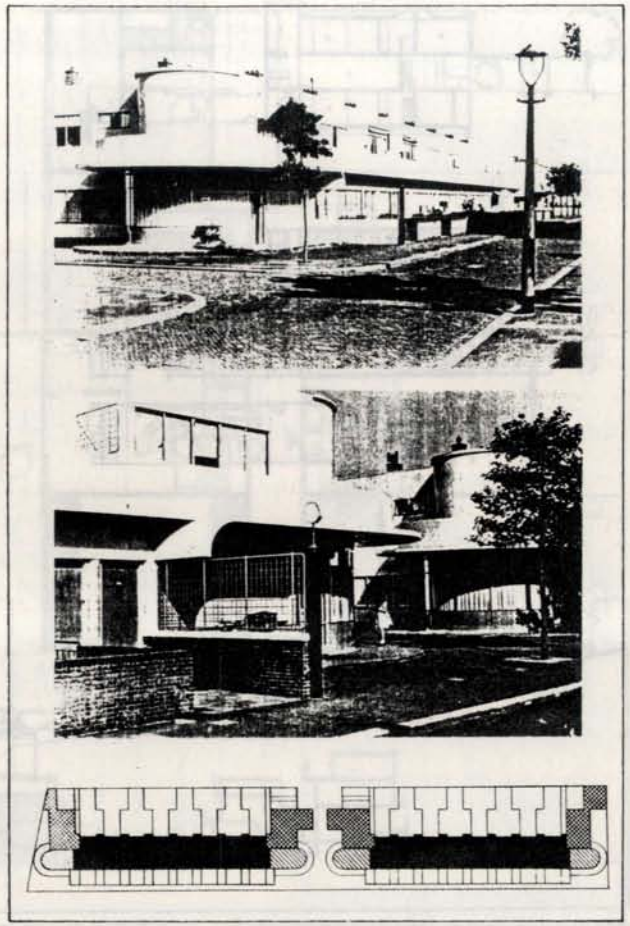


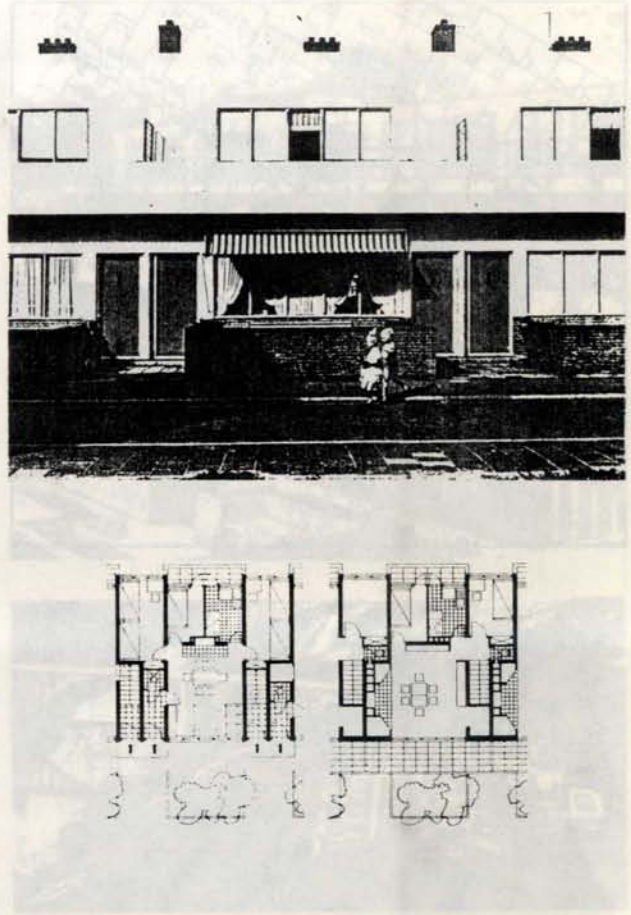
1.6 Settlement Eiwog Dinhard ZH, Switzerland
by Fritz Schwarz, 1972-74
Typical Floor Plans
Section



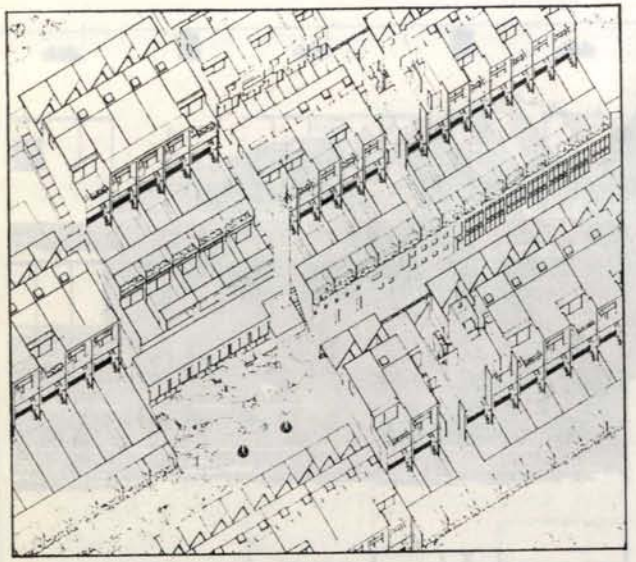
1.7 Apartment House in Flamatt, Switzerland
by Atelier 5, 1957
Floor Plans
Section

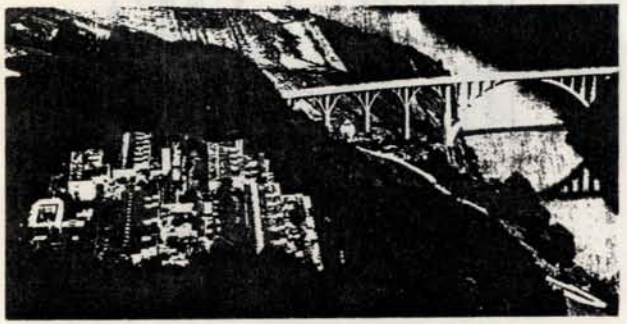
The double-oriented, open-ended unit is very popular for dense low-rise housing even today. Depending on the layout in plan and the treatment of the vertical surface, each individual rowhouse unit can be recognized, as shown with the example of Eiwog Dinhard ZH. Several units together can form one apartment house and still provide private access to each unit. A good example is the apartment house in Flamatt by Atelier 5. In many cases, the individual unit disappears within the whole settlement. Three examples are rowhouses in Rotterdam by J. J. P. Oud, the Halen Siedlung near Berne by Atelier 5 and the Fleet Road terrace housing in London by Neave Brown.



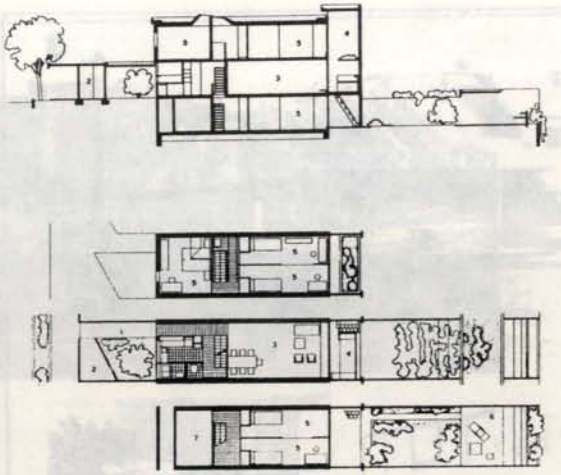


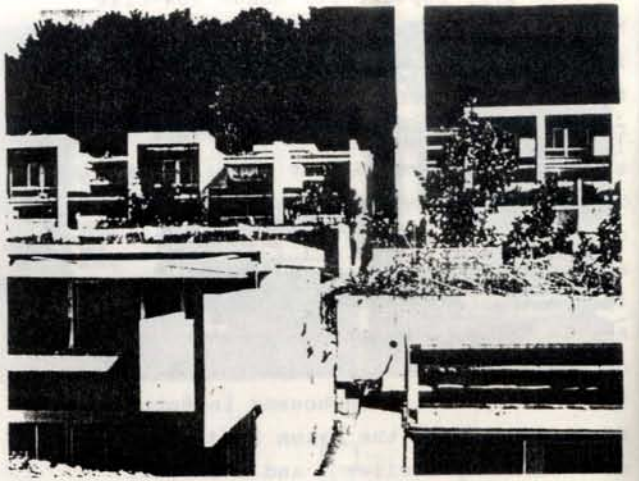
1.8 Rowhouses in Rotterdam
by J.J.P. Oud, 1924
Site Plan
Floor Plans

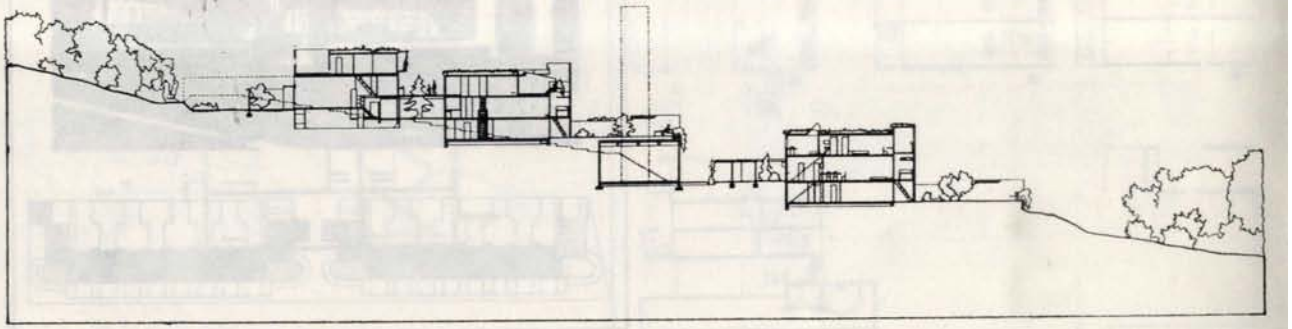




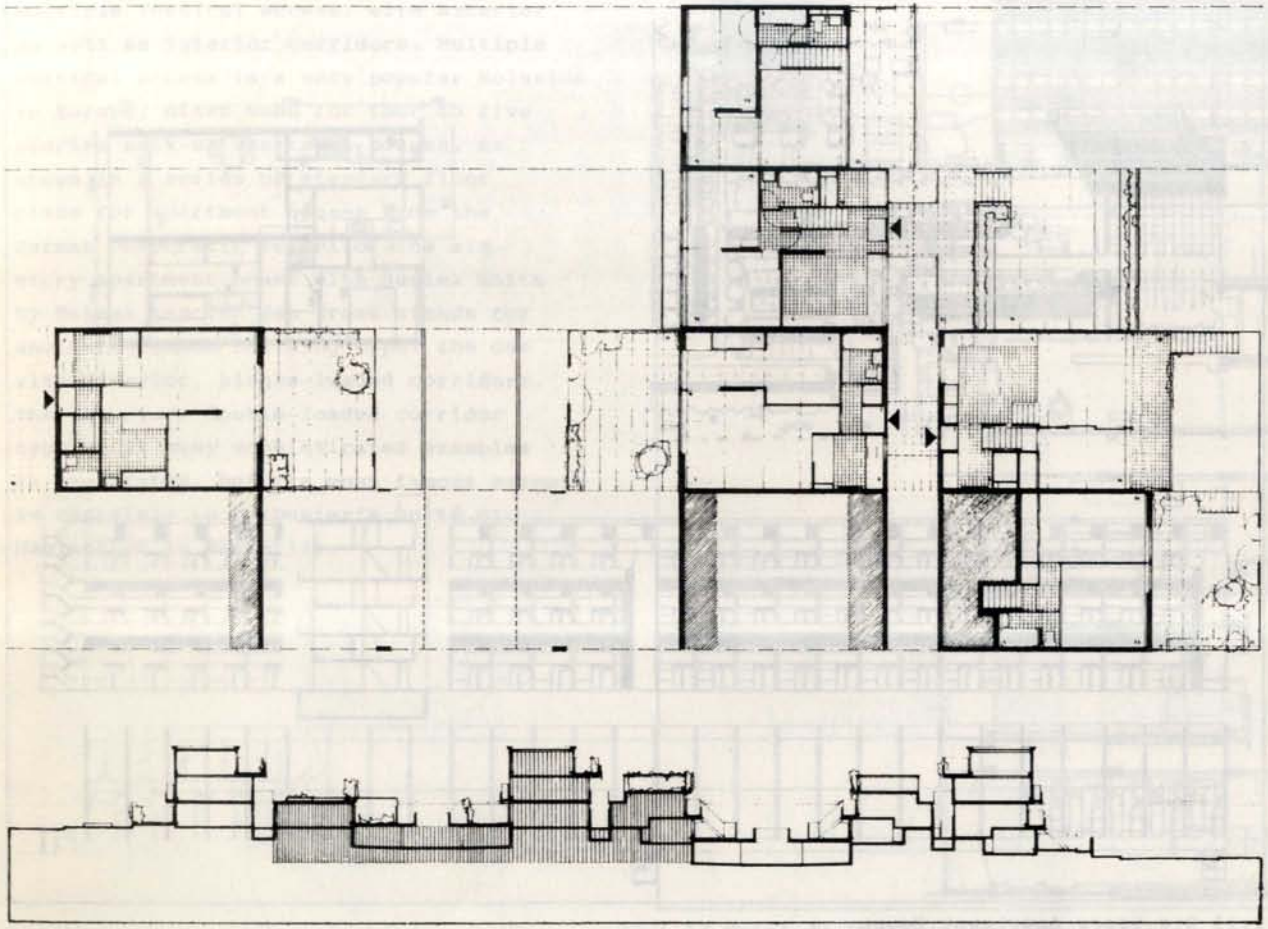
1.9 Halen Siedlung near Berne
by Atelier 5, 1963
Axonometric

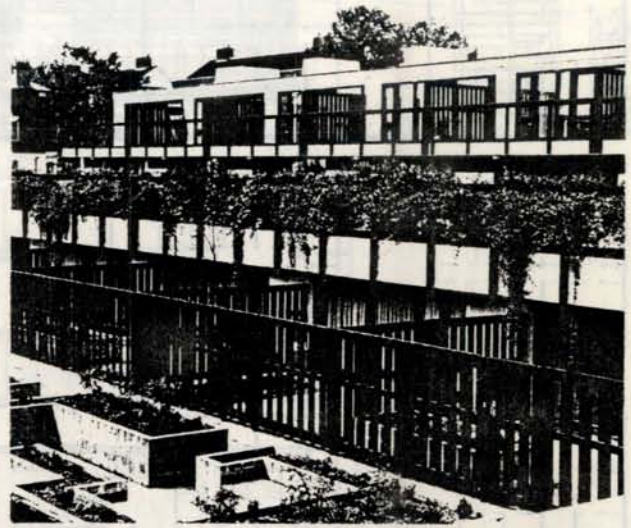




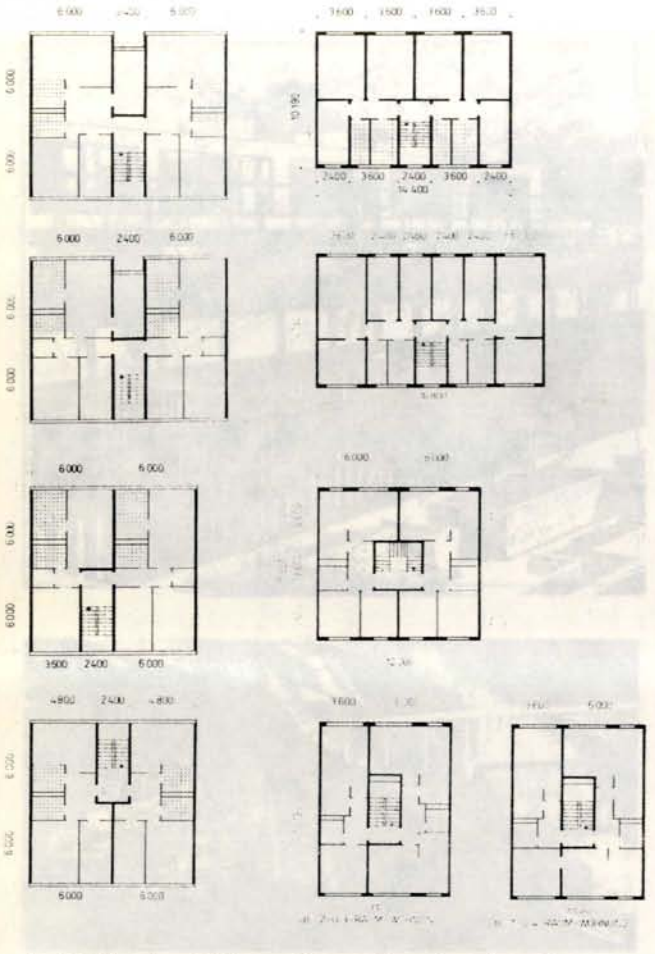


1.10 Typical Unit, Section
Typical Unit, Floor Plans
Site Section

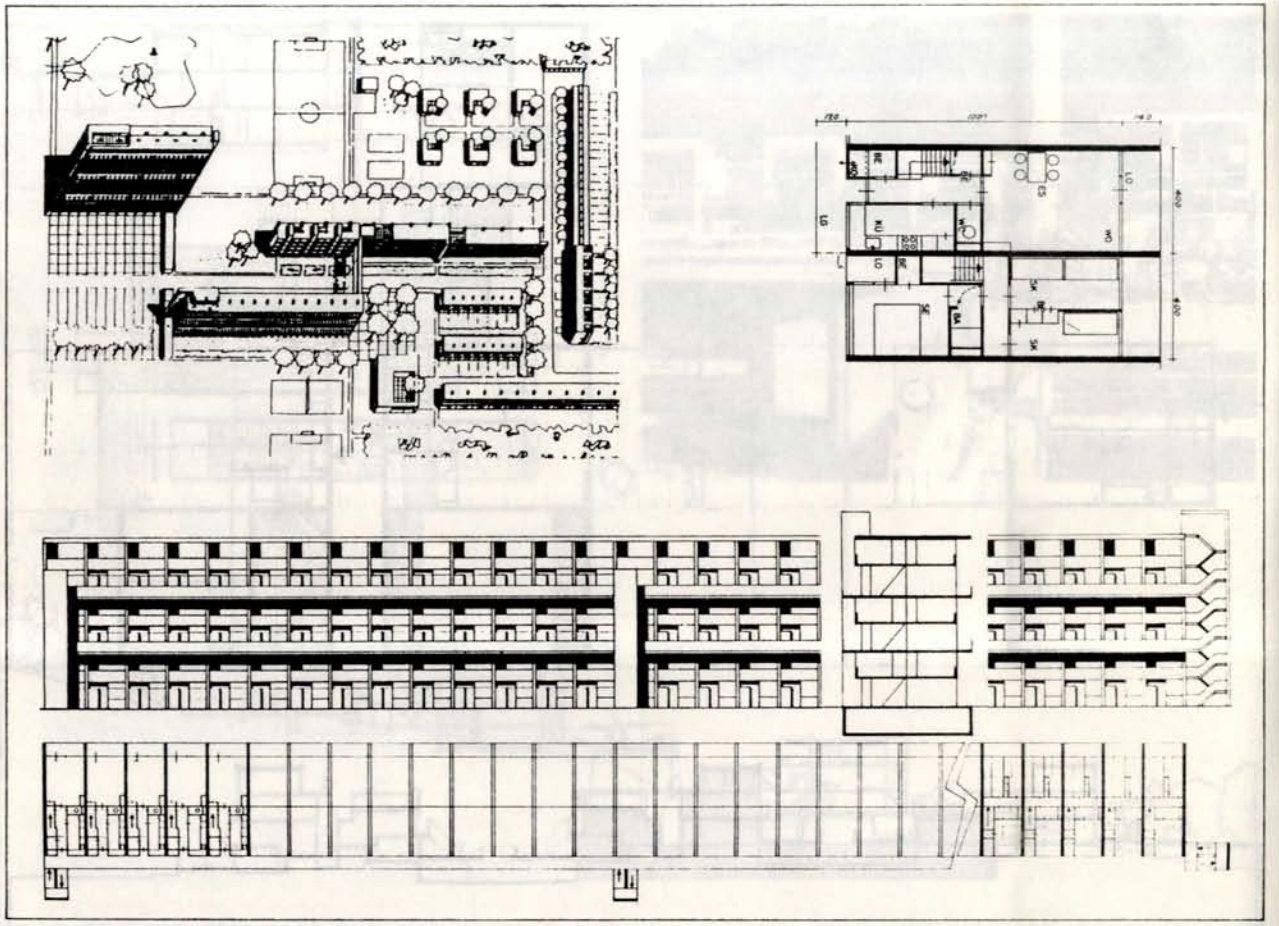




1.11 Fleet Road Terrace Housing, London
by Neave Brown, 1967
Floor Plans
Section

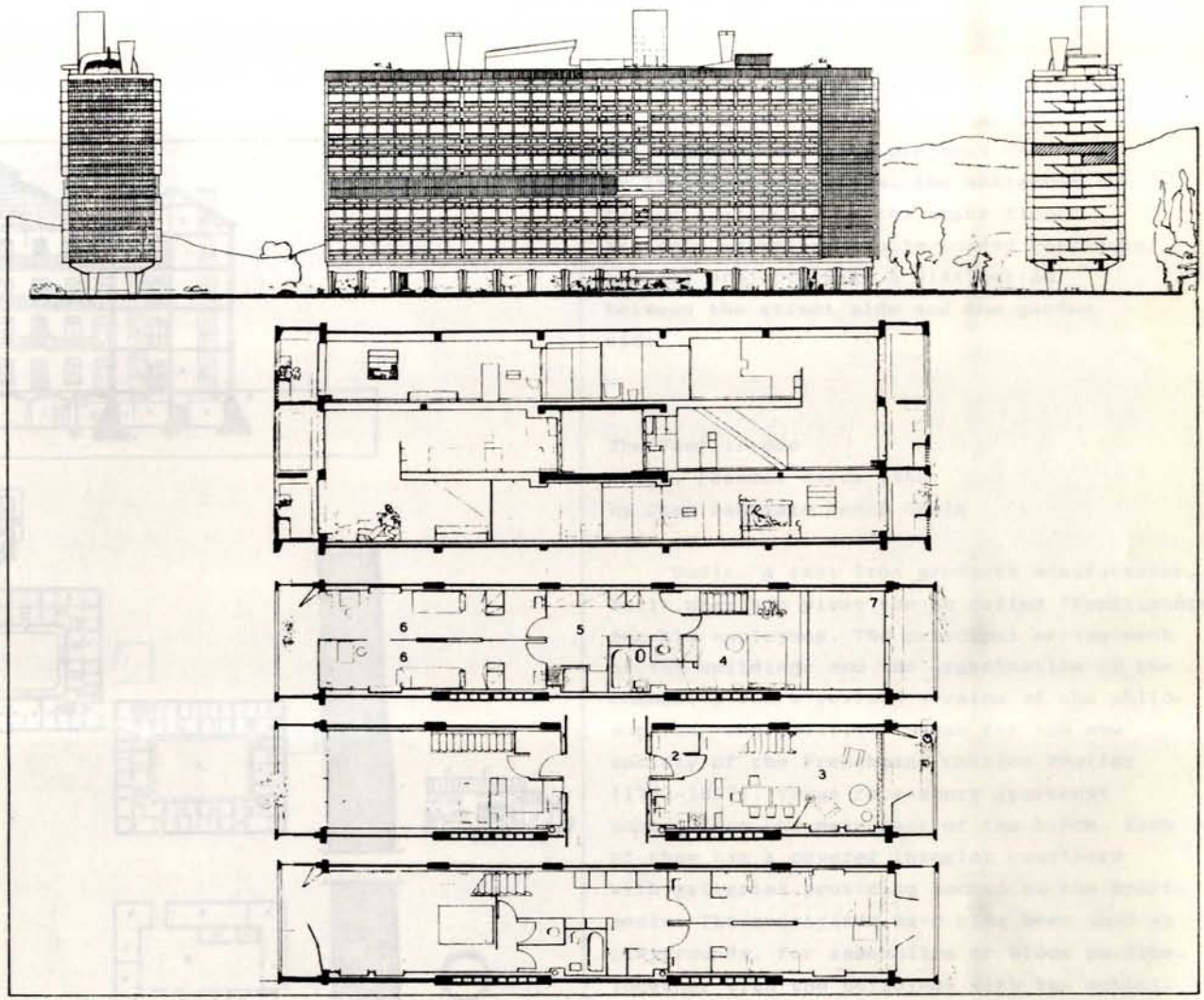


1.12 Standard Floor Plans for Apartment
from the German Democratic Republic
by Kress and Rietdorf, 1972



1.13 Six-Story Apartment House
by Bakema and van den Broek, 1959
Context Axonometric
Typical Unit, Floor Plans
Elevation, Section
Plan

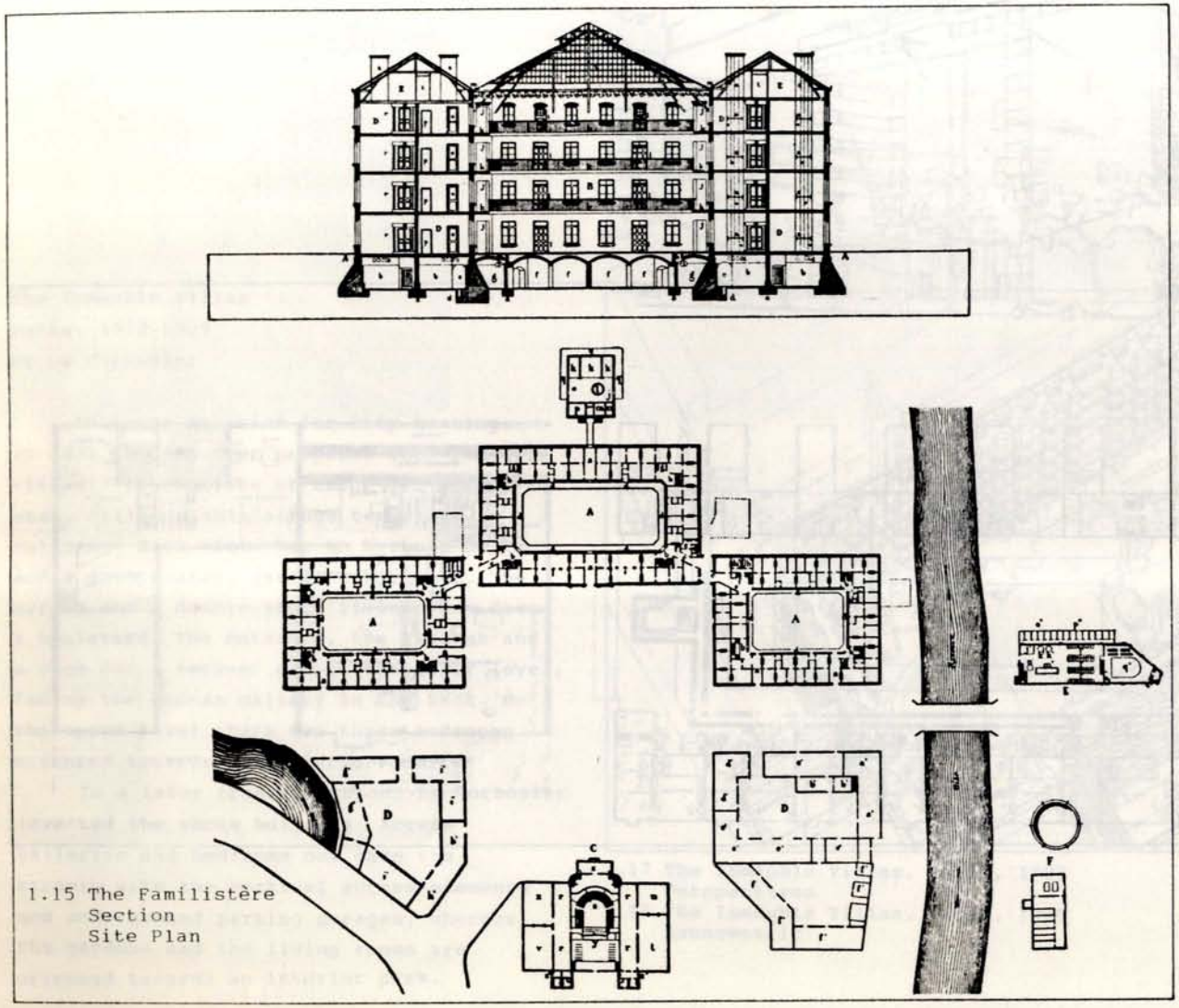
The unit is also used in very different high-rise projects, in buildings with multiple vertical access, with exterior as well as interior corridors. Multiple vertical access is a very popular solution in Europe, often used for four to five stories walk-up apartment houses, as shown in a series of standard floor plans for apartment houses from the German Democratic Republic. The six-story apartment house with duplex units by Bakema and van den Broek stands for another, common building type: the one with exterior, single-loaded corridors. The interior, double-loaded corridor type knows many sophisticated examples in the States, but its most famous example is certainly Le Corbusier's Unité d' Habitation in Marseille.



1.14 Unité d' Habitation in Marseille
by Le Corbusier, 1945-52
Elevations, Section
Typical Unit, Section
Typical Unit, Floor Plans

Buildings

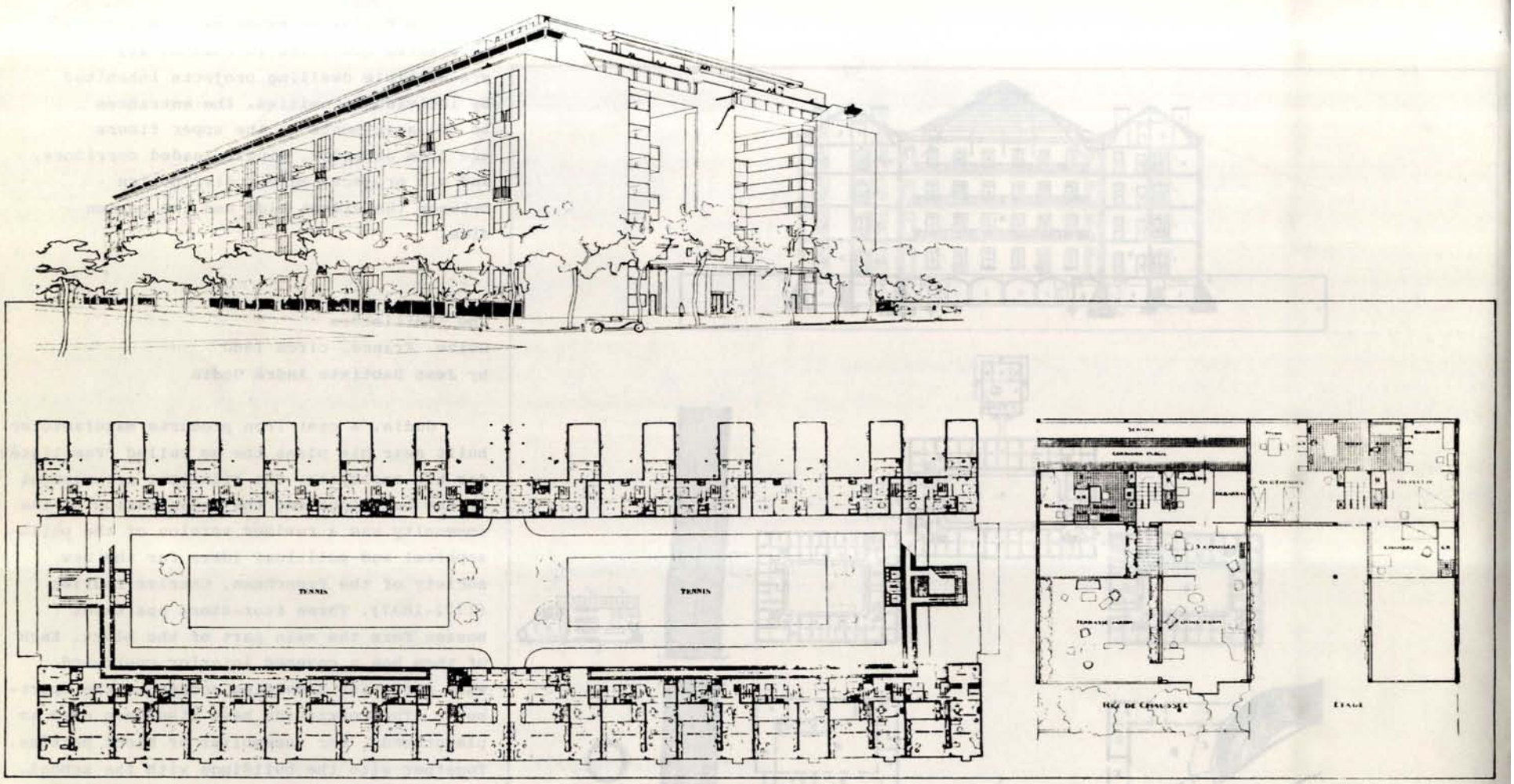
The following examples of buildings have three qualities in common: all are multiple dwelling projects inhabited by individual families, the entrances to the apartments on the upper floors are from exterior, single-loaded corridors, and all projects make a distinction between the street side and the garden side.



1.15 The Familistère
Section
Site Plan

The Familistère
Guise, France, circa 1860
by Jean Babtiste André Godin

Godin, a cast iron products manufacturer, built near his plant the so called "Familistère" for his employees. The principal arrangement of the buildings and the organization of the community was a revised version of the philosophical and political ideas for the new society of the Frenchman, Charles Fourier (1772-1837). Three four-story apartment houses form the main part of the block. Each of them has a covered interior courtyard with galleries providing access to the apartments. The courtyards have also been used as playgrounds, for assemblies or block parties. Together with the buildings with the school, a theater, stables, shops and a restaurant, the three apartment houses define a central square. Other buildings on the property accommodate a day care, a public bathroom with an indoor pool and the gas works.

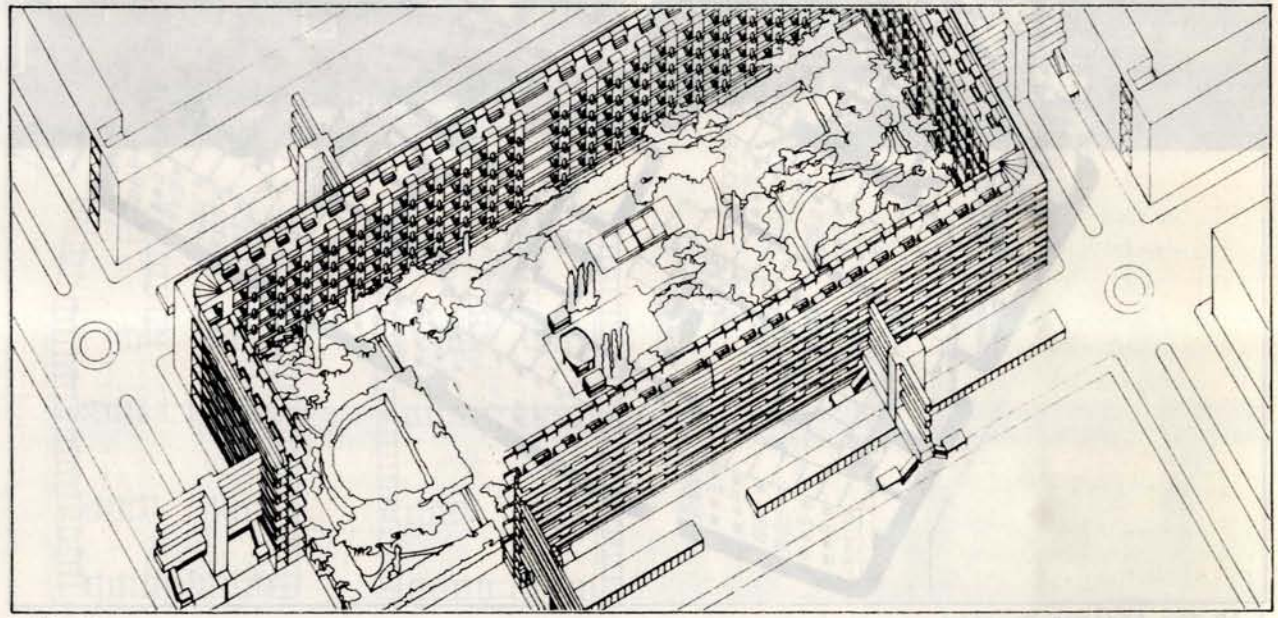


1.16 The Immeuble Villas, Paris, 1922
Perspective View
Building Plan
Typical Unit, Floor Plans

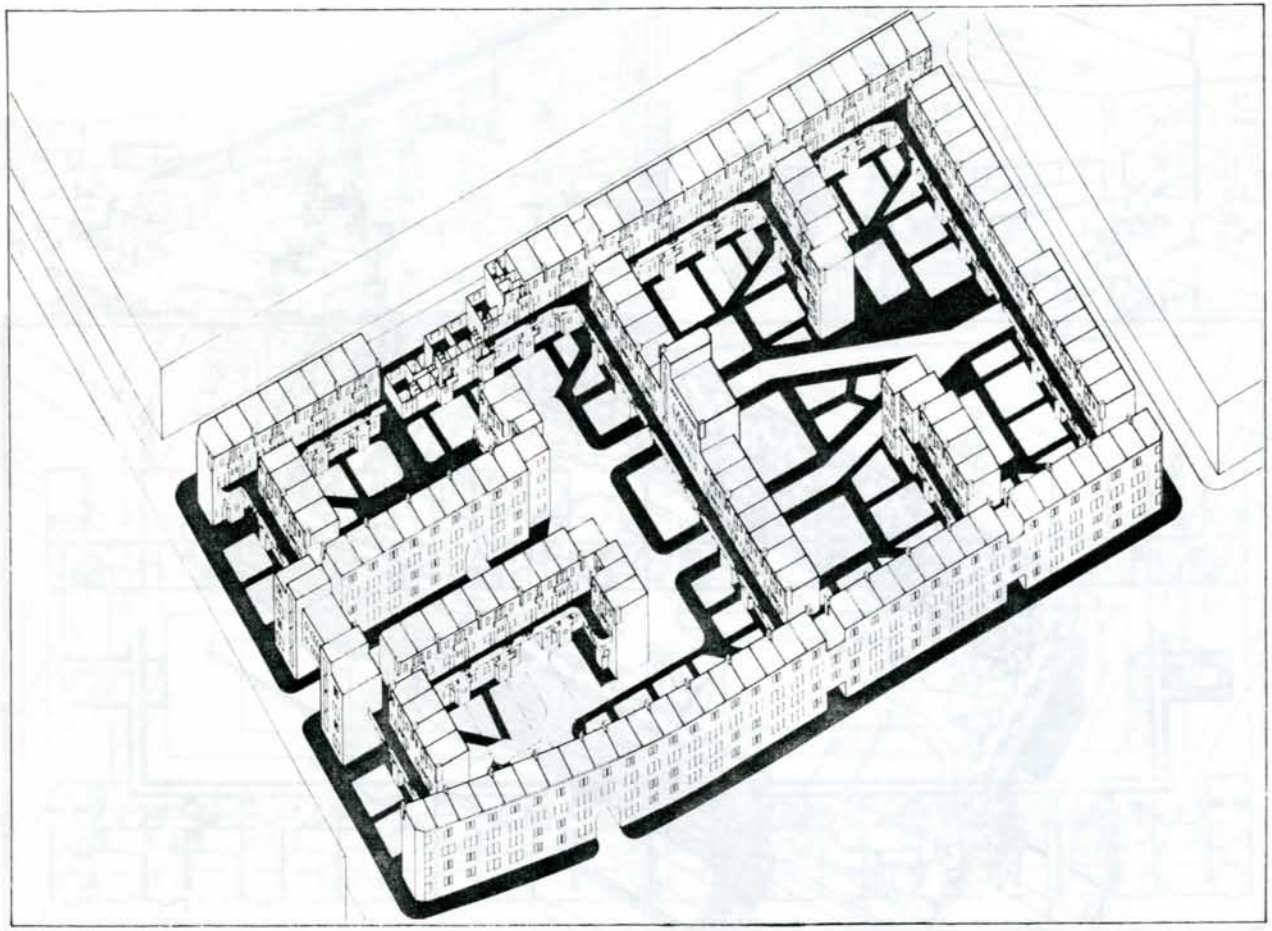
The Immeuble Villas
Paris, 1922-1929
by Le Corbusier

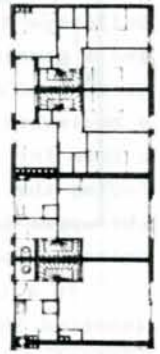
As a new solution for city housing, in 1922 Le Corbusier proposed the "Immeuble Villas". It consists of about 120 double-story villas within a huge ten-story building. Each villa has an L-shape solid and a double-story garden cubic void. The garden and a double-story living room face a boulevard. The entrance, the kitchen and a room for a servant are on the lower level, facing the access gallery in the back. On the upper level there are three bedrooms oriented towards the interior court.

In a later transformation, Le Corbusier inverted the whole building. Access galleries and bedrooms now face the streets with the vertical access elements and underground parking garages, whereas the gardens and the living rooms are oriented towards an interior park.



1.17 The Immeuble Villas, Paris, 1922
Perspectives
1.18 The Immeuble Villas, Paris, 1929
Axonometric



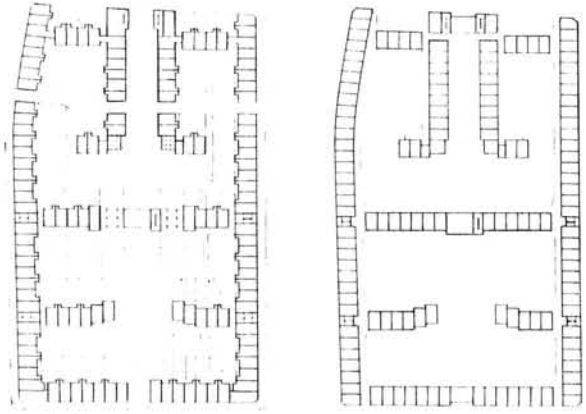


1.19 The Spangen Quarter
Axonometric
Typical Units, Floor Plans

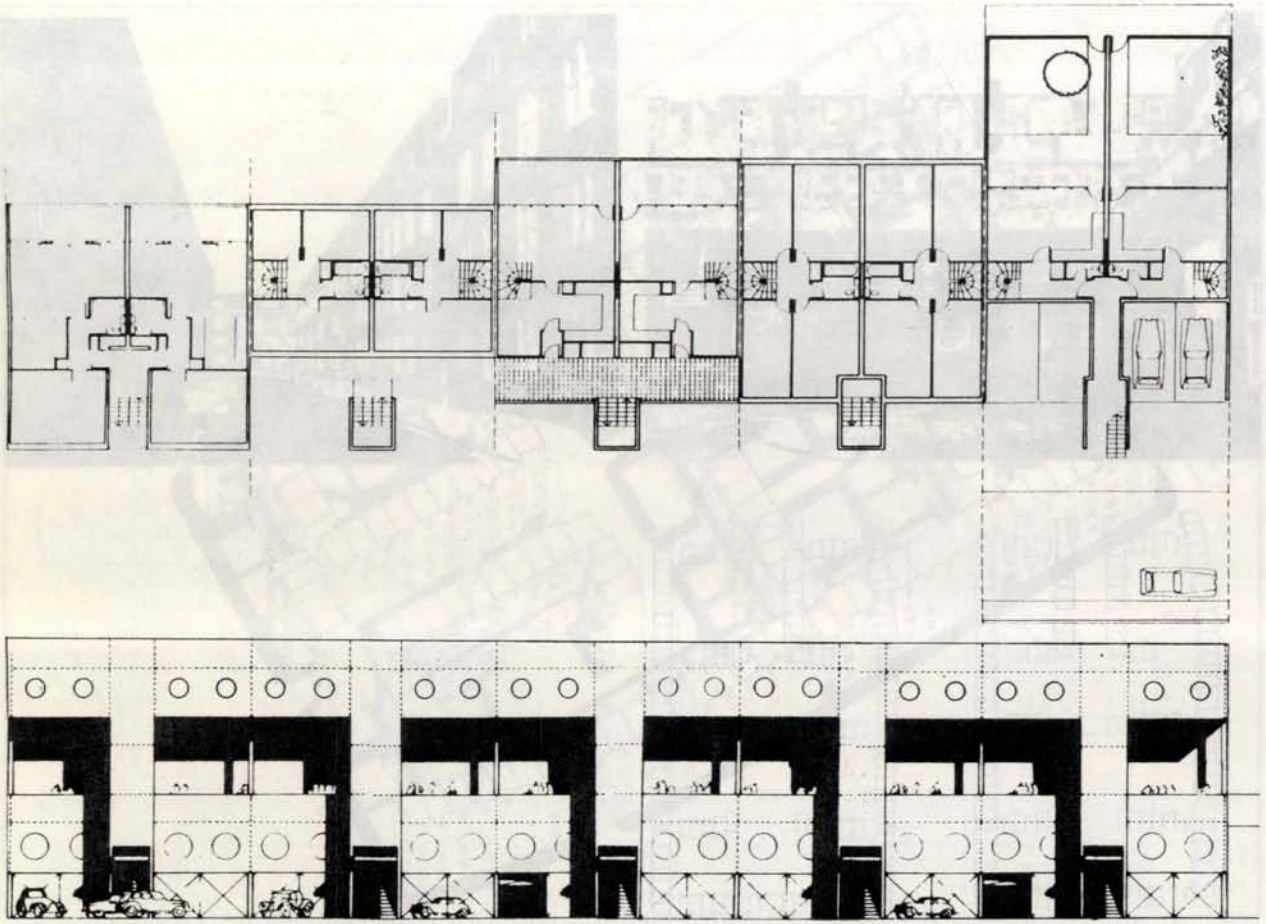
The Spangen Quarter
Rotterdam, 1919-1921
by Michiel Brinkman

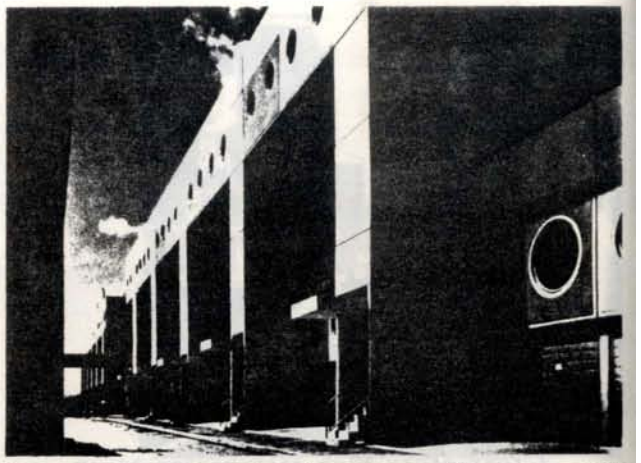
A four-story high rectangular block of about 470 by 260 feet contains about 260 three bedroom apartments. The interior garden, which provides access to the units, is divided into two courtyards of more or less the same size that are further divided by wings projecting from the main block. In the central traverse wing there are common facilities such as laundry, washrooms, a children's play space and the heating plant. Above flats in the first two floors, there are double-story apartments accessed by an open, external gallery on the third floor.

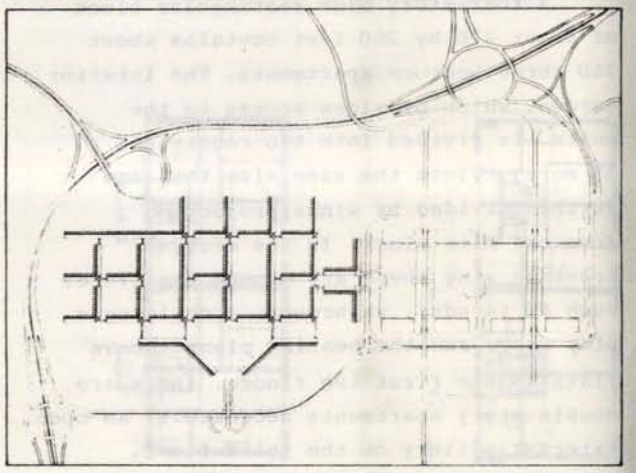
The building is plain, mostly wall, on the street side. The garden side is highly articulated with the freestanding gallery, the balconies, and the many windows, doors, and chimneys.



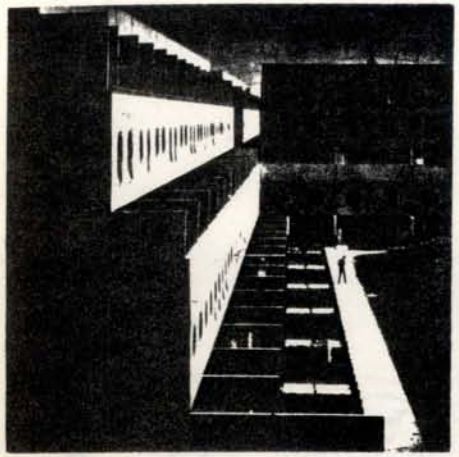
1.20 The Spangen Quarter
Site Plan
Gallery Plan

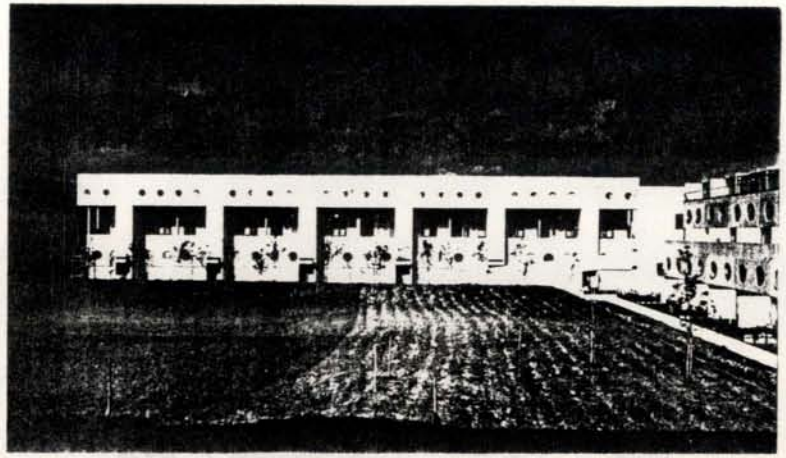


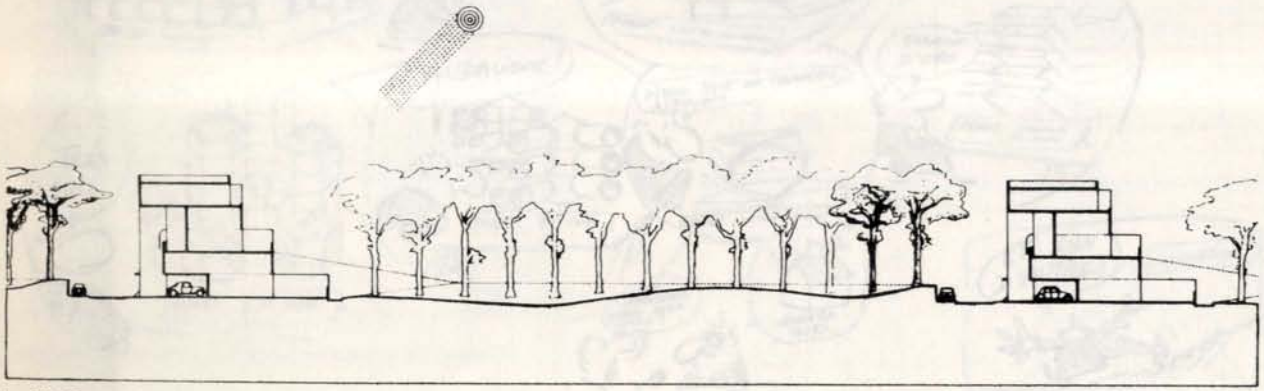




1.21 Town Center Housing, Runcorn New Town
Typical Unit, Floor Plans
Street Elevation
Site Plan







1.22 Town Center Housing, Runcorn New Town
Section

Town Centre Housing
Runcorn New Town, 1968
by James Stirling and Partners

The low cost housing project for about 6000 people in Runcorn New Town consists of five-story building units, that can be added along a network of access roads and elevated pedestrian walkways. To avoid concentration of a particular social group, apartments of different sizes are contained within each unit. On the ground floor, there are four garages and two four bedroom duplexes with a private garden. On the third floor, accessed directly from the pedestrian walkway, there are two three bedroom duplexes. Two one bedroom apartments are on the top floor. Each unit has on one side a stair that connects the ground floor (road access) with the third floor (pedestrian walkway) and the top floor. On the other side, each apartment has an uncovered, private outdoor space facing a park.

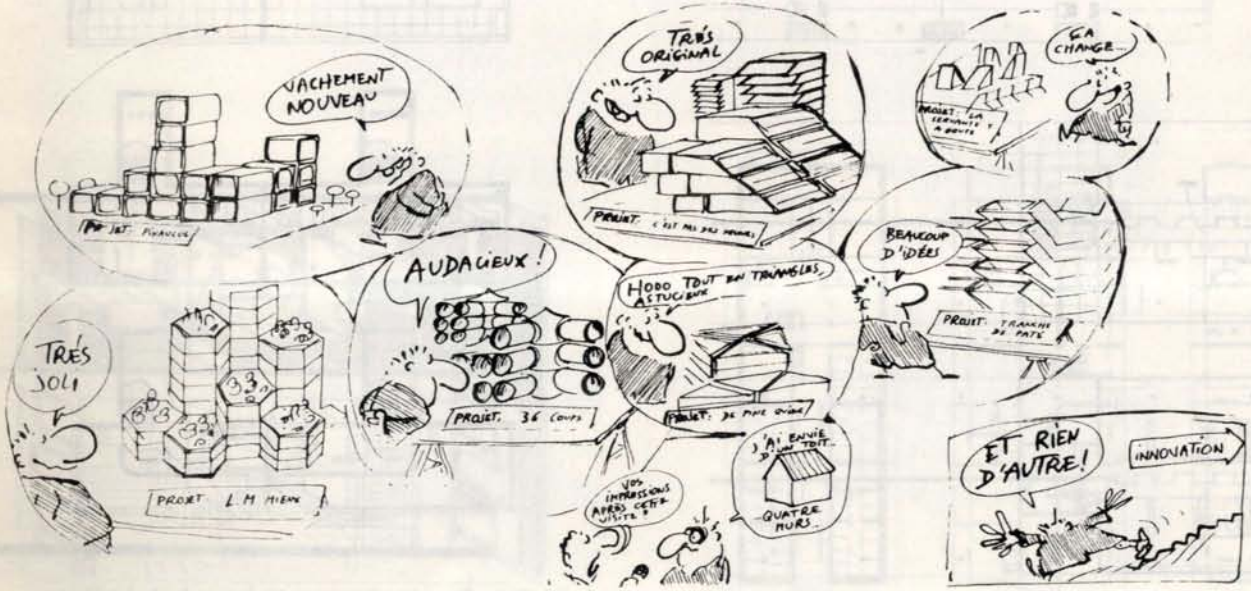
Contrary to the other precedents, Runcorn does not clearly define public and private spaces. For once, the park spaces have streets on two sides and gardens on the other two. Also, there are special corner units missing, therefore the joints of the bars and the corners are loosely defined; they appear unfinished.

Experimental Dwellings

In the last chapter of this survey I am looking at one special aspect of the experimental dwellings: the different attempts to provide possibilities for alterations to be done by the occupants. I will put the examples in a logical order: from flexibility to variability. By coincidence they will be at the same time in a more or less chronological order. What do flexibility and variability mean in this context?

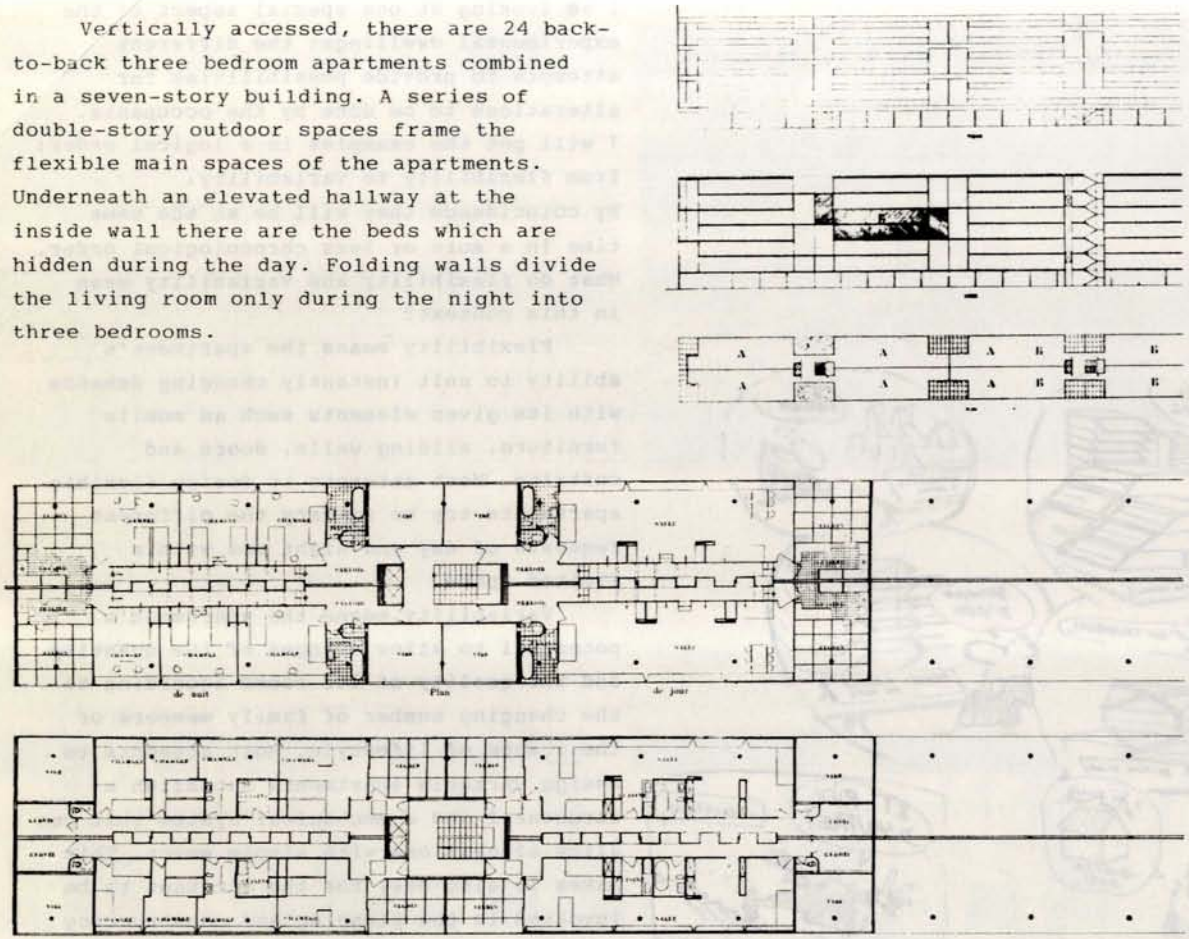
Flexibility means the apartment's ability to suit instantly changing demands with its given elements such as mobile furniture, sliding walls, doors and curtains. Most attempts to design flexible apartments try to satisfy the different requests of day and night use within limited space.

Variability means the apartment's potential to allow changes of the quantity and the quality of its rooms according to the changing number of family members or the change of lifestyle. Most attempts to design variable apartments establish a structural and a mechanical system that can allow alterations with simple means. This makes it also easy for the occupant to be involved in the planning and constructing process.



Immeuble Locatif
Stuttgart, 1928/1929
by Le Corbusier

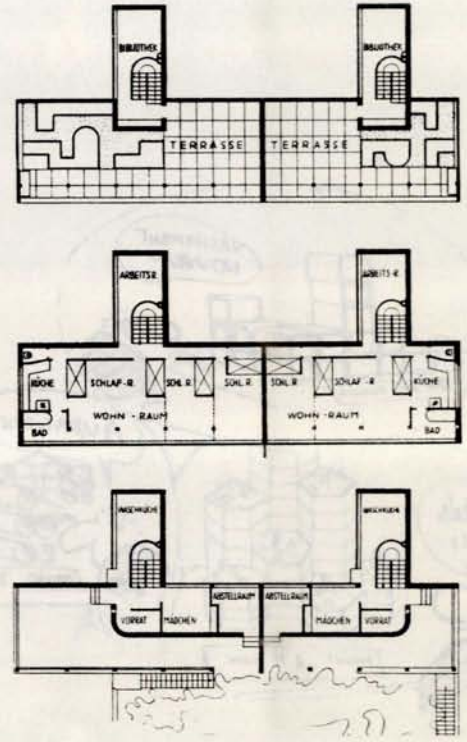
Vertically accessed, there are 24 back-to-back three bedroom apartments combined in a seven-story building. A series of double-story outdoor spaces frame the flexible main spaces of the apartments. Underneath an elevated hallway at the inside wall there are the beds which are hidden during the day. Folding walls divide the living room only during the night into three bedrooms.



1.23 Immeuble Locatif
Elevation, Section, Plan
Two Apartment Types, Plans showing use by night and by day

Two Family House, Weissenhofsiedlung
Stuttgart, 1927
by Le Corbusier

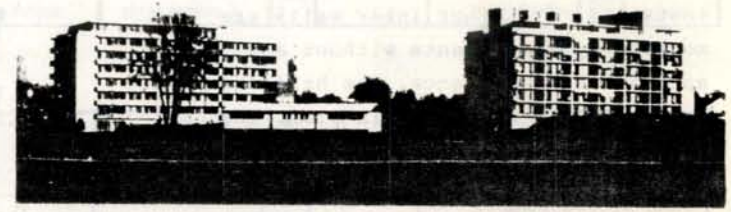
Movable partitions subdivide the long living room into two or three bedrooms during the night. To have individual access to each bedroom, there is a hallway along the back wall.

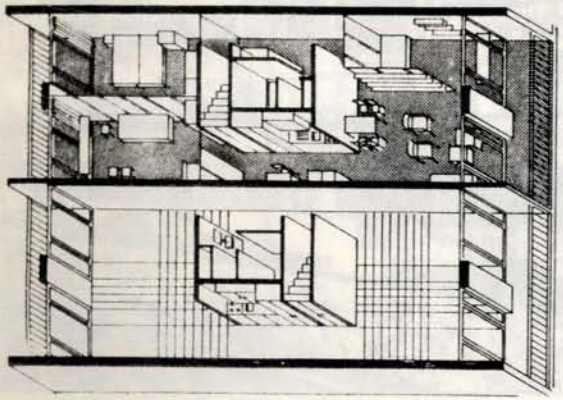


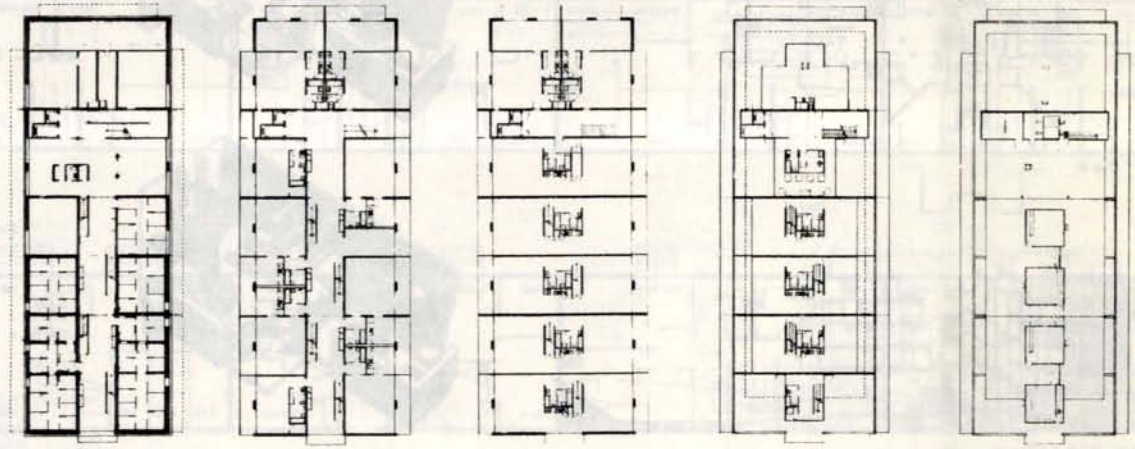
1.24 Two Family House, Weissenhofsiedlung
Floor Plans

Apartment House Neuwil
Wohlen, Switzerland, 1966
by Metron architects

The small "unité" with interior double-loaded corridors every third floor consists of 49 different sized apartments. All have a core with kitchen, bathrooms and stairs, where there are no alterations possible and one or two areas that can be divided into smaller rooms with a special wall system. Extra wall elements are stored in the basement, and can be used for future alterations.



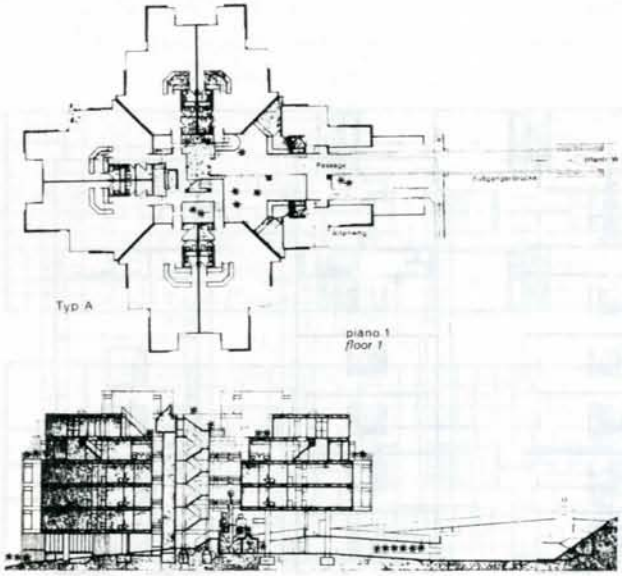


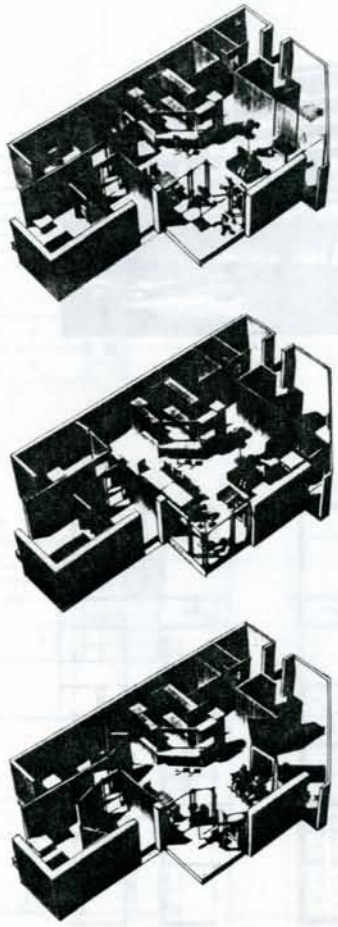


1.25 Apartment House Neuwil
Typical unit, Grid for Partitions
Floor Plans

Habiflex
Wulfen, Germany, 1974
by Richard Gottlob and Horst Klement

Forty different sized apartments are clustered on five floors around a vertical access core. The interior kitchen and the bathrooms of each apartment are completely installed. All other inner walls are movable by the tenants without any specialized assistance. The habitable space is completely alterable in plan. The frontage is adjustable by the positioning of the windows.

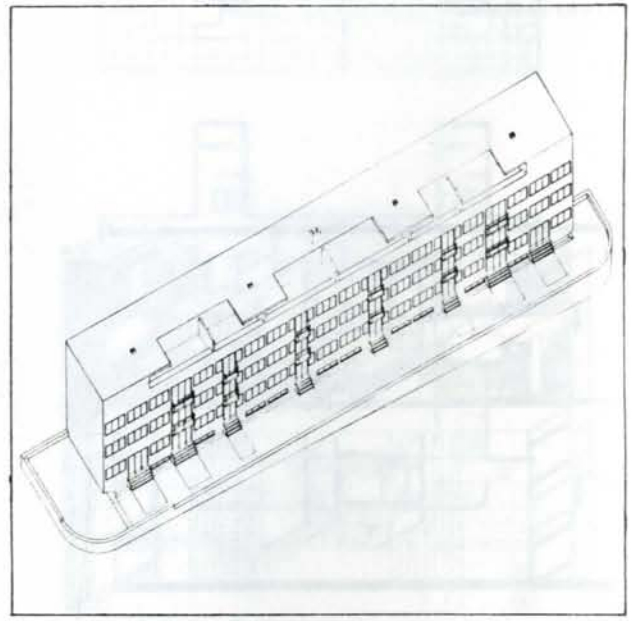




1.26 Habiflex
Typical Floor Plan
Section
Alterations of one Unit

Apartment House, Weissenhofsiedlung
Stuttgart, 1927
by Mies van der Rohe

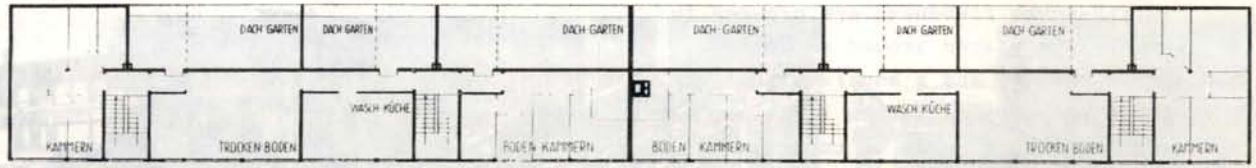
The four-story building is arranged around four internal sets of stairs that serve two apartments on the first three floors. The top floor is given over to the laundries and terraces. A steel skeletal structure allows the placement of partitions inside the apartments according to individual design.



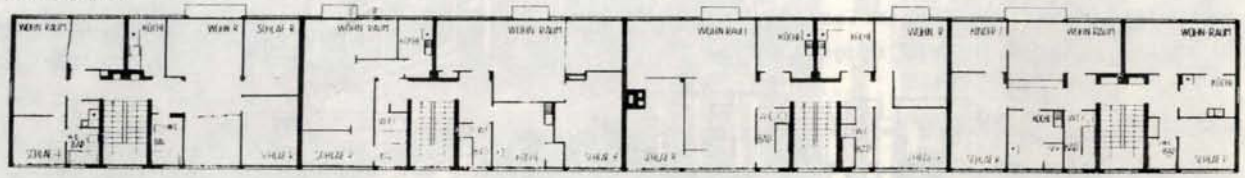
1.27 Apartment House, Weissenhofsiedlung
Axonometric

1.28 Apartment House, Weissenhofsiedlung
Floor Plans

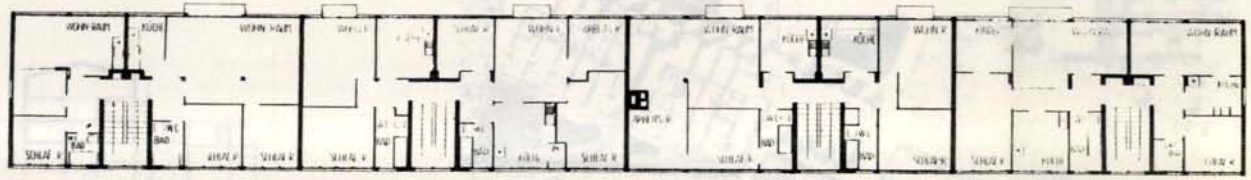
Dachgeschoß



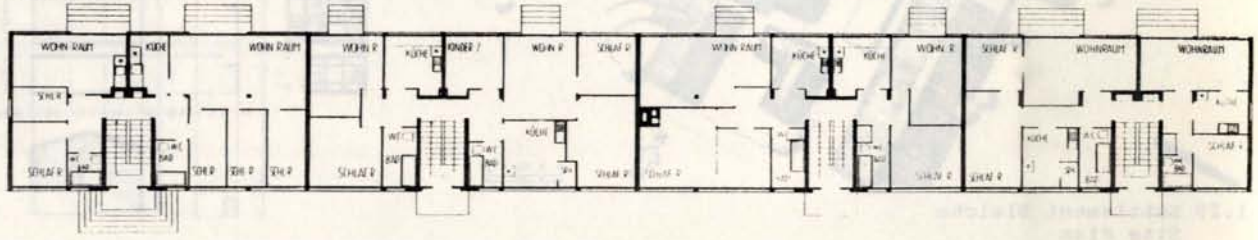
2. Obergeschoß



1. Obergeschoß

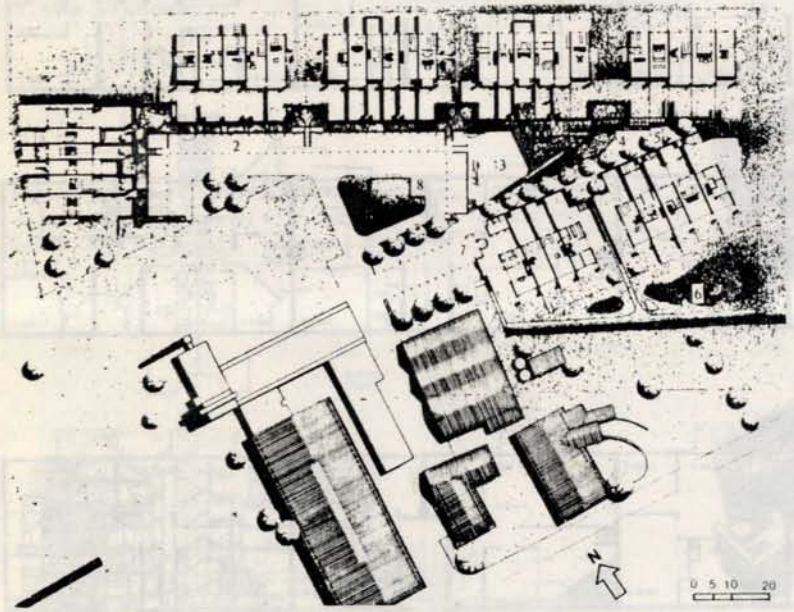


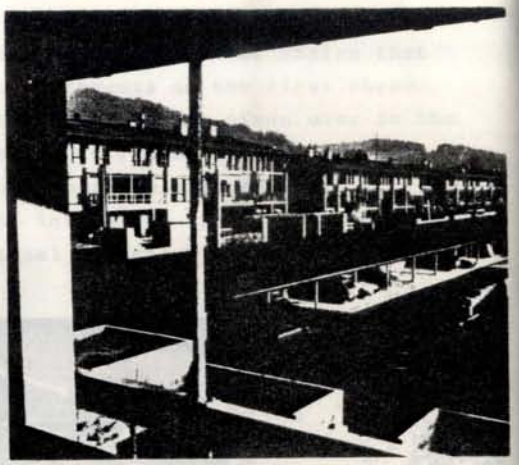
Erdgeschoß

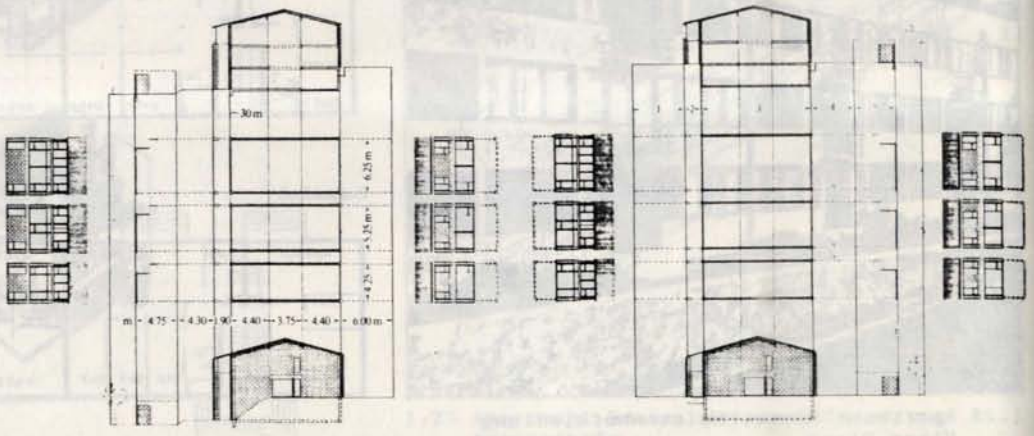


Settlement Bleiche
Worb, Switzerland, 1980-1982
by Franz Oswald

Thirty-seven rowhouses are grouped in seven buildings placed around a court with the common parking and a square with a children's playground. Within identical three-story "shells" made of concrete blocks there are houses with three different widths available. Their interiors can be planned and built in different materials according to individual designs and budgets.



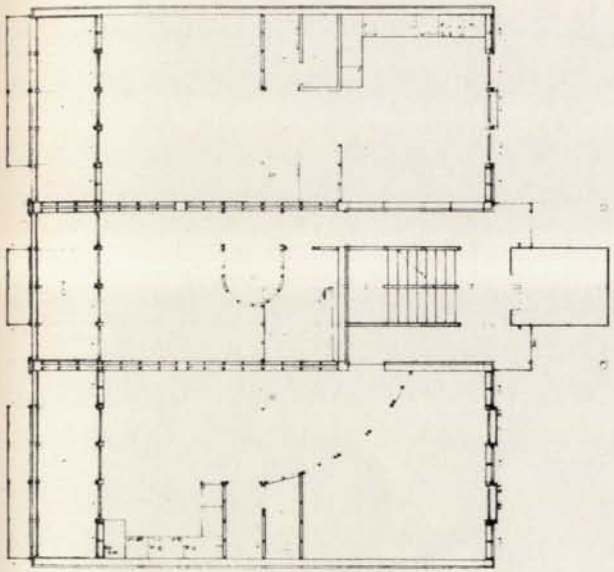




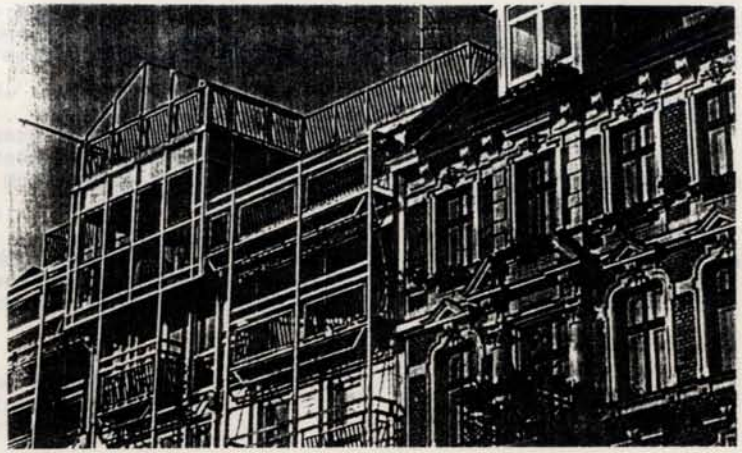
1.29 Settlement Bleiche
Site Plan
Typical Units, "shells"

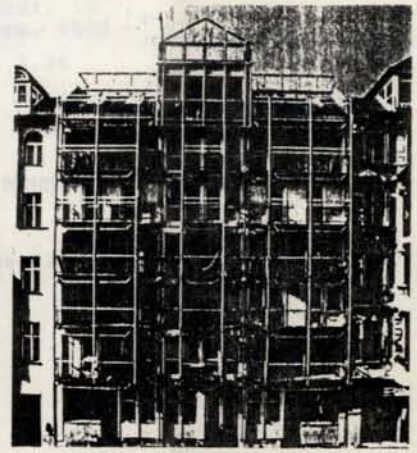
Wohnregal
Berlin, 1986
by K. Nylund, P. Stuerzebecher and
C. Puttfarken

Twelve duplex apartments sit in a so-called "housing shelf" in a party-wall site. The given main structure is built of precast concrete elements and consists of an access core and slabs every second floor, held up by columns. Within this structure, wood frame facades, interior walls and mezzanine floors can be added by the inhabitants, partially according to their own design.



1.30 Wohnregal
Floor Plan





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